

INTEGRATED GEOMETRY

INTRO TO GEOMETRY


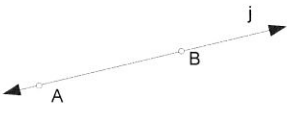
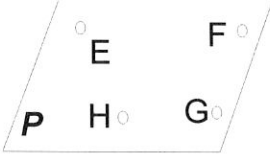
MS. HUNT

NAME _____


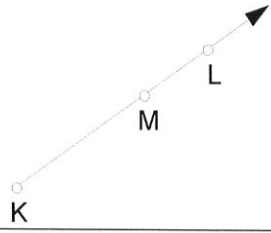
POINTS, LINES AND PLANES

Use your textbook to complete the charts below. DO NOT copy the descriptions/definitions “word for word,” instead describe each in YOUR own words!

3 Undefined Terms in Geometry

Undefined Terms	Description	Example	How to Name It (Description and Example)
POINT	The smallest thing in geometry. . . it has no size! (Like a dot).		Named using the word “Point” and the letter next to the point. EX: Point A
			1. 2.
			1. 2.

Definitions of Other Geometric Terms

	Definition	Example	How to Name It (Description and Example)
Segment or Line Segment			
Ray			

Other Important Definitions

Collinear points - _____

Noncollinear points - _____

Draw an example of each.

Collinear Points	Noncollinear Points

Coplanar points - _____

Noncoplanar points - _____

Endpoint - _____

What two geometric figures have one or more endpoints? _____ and _____

Initial Point - STARTING POINT OF A RAY.

Opposite rays - _____

Draw and label a pair of opposite rays:

Intersection - _____

Draw two lines whose intersection is point A:

1. First describe what each of these symbols represents. Second draw each figure.

a. \overline{PQ}

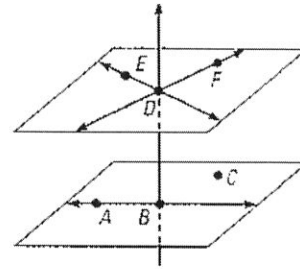
b. \overrightarrow{PQ}

c. \overleftrightarrow{PQ}

d. \overrightarrow{QP}

2. Use the picture at right to decide whether the statement is *true* or *false*.

- a. _____ Points A, B, and C are collinear
- b. _____ Points A, B, and C are coplanar.
- c. _____ Point F lies on \overleftrightarrow{DE} .
- d. _____ \overleftrightarrow{DE} lies on plane DEF.
- e. _____ \overleftrightarrow{BD} and \overleftrightarrow{DE} intersect.
- f. _____ \overleftrightarrow{BD} is the intersection of the plane ABC and plane DEF.



3. Identify each as being best modeled by a *point*, *line*, or a *plane*.

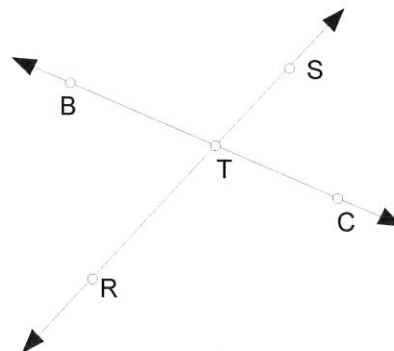
- a. a star _____
- b. a notebook cover _____
- c. a ruler edge _____
- d. the tip of a pen _____
- e. a sheet of paper _____

4. Tell whether each statement is true or false. If it is false, explain your reasoning.

- a. Two planes intersect in only one point. _____
- b. A ray starts at one point and goes on forever. _____
- c. \overline{AB} is the same segment as \overline{BA} . _____

5. Use the picture at right to decide whether each statement is *true* or *false*.

- a. C, T, and B are collinear. _____
- b. \overleftrightarrow{RS} is the same as \overleftrightarrow{RT} . _____
- c. C, T, and B name a plane. _____
- d. R, T, and C are collinear. _____
- e. Four rays start at T. _____



POINT, LINE, and PLANE POSTULATES

POSTULATE: _____

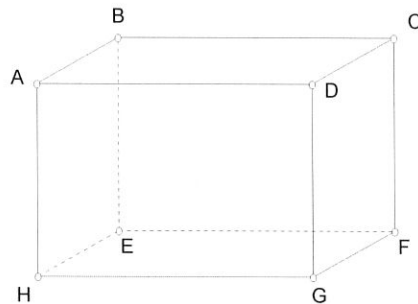
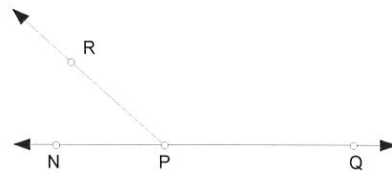
THEOREM: _____

DIRECTIONS: Complete the following postulates with the word or words that you *think* would make the statement true.

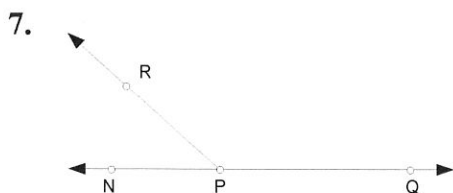
1. Through any 2 points there exists _____ line.
2. A line contains at least _____ points.
3. If two lines intersect, then their intersection is exactly one _____.
4. Through any 3 noncollinear points there exists _____ plane.
5. A plane contains at least 3 _____ points.
6. If two points lie on a plane, then the line containing them lies _____ the _____.
7. If two planes intersect, then their intersection is a _____.

PART 1: Use the pictures provided to help you answer each question. Use the correct notation when writing your answers.

1. What is the intersection of \overleftrightarrow{PN} and \overleftrightarrow{PQ} ? _____
2. What is the intersection of \overleftrightarrow{NQ} and \overleftrightarrow{PQ} ? _____
3. What is the intersection of \overleftrightarrow{RP} and \overleftrightarrow{NP} ? _____
4. What is the intersection of plane ABE and plane GFE? _____
5. What is the intersection of \overline{DC} and \overline{CF} ? _____
6. What is the intersection of \overline{HG} and plane ADG? _____

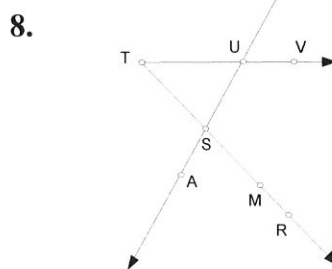


PART 2: Name all the sets of points in each figure below that are collinear and three points that are noncollinear.



Collinear points:

3 noncollinear points:

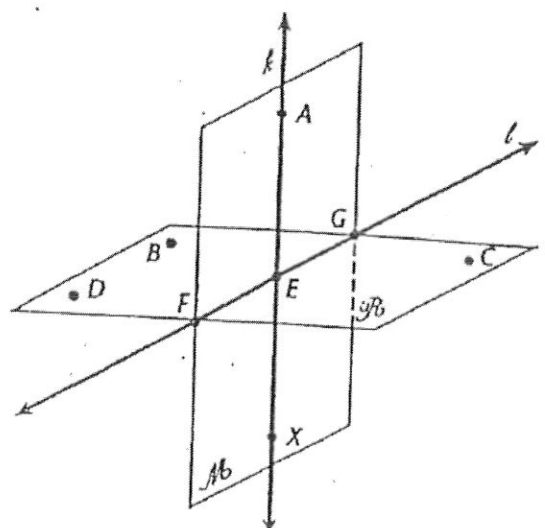


Collinear points:

3 noncollinear points:

PART 3: Use the figure at right to answer each problem below.

9. Name three points that determine plane R .
10. Name the intersection of plane R and plane M .
11. Name the intersection of line l and line k .
12. How many planes contain points B, D, and E?
13. How many planes contain points G, E, and F?
14. If line k is contained on plane M , then what points must be contained in plane M ?



LESSON
1-1
Practice A
Understanding Points, Lines, and Planes

Use the figure for Exercises 1–3.

1. Name two points that determine line \overleftrightarrow{AC} .

2. Name a point that is NOT collinear with point A and point C.

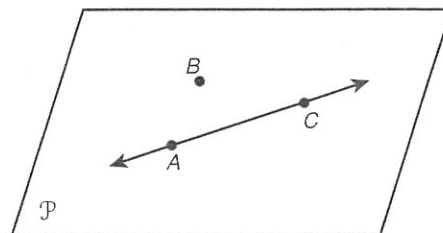
3. Name the points that determine plane ABC. _____

4. Two points determine one _____.

5. Collinear points lie on the same _____.

6. Three noncollinear points determine a _____.

7. Coplanar points lie in the same _____.



Use the figure for Exercises 8–10.

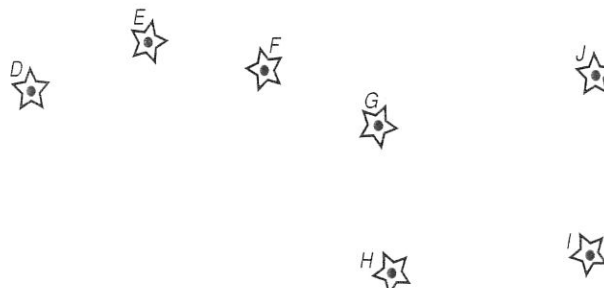
8. A line segment is a part of a line and has two endpoints. Name the endpoints of \overline{TU} .

9. Find the number of endpoints of \overrightarrow{UV} . _____

10. A ray is a part of a line that has one endpoint. Name the endpoint of \overrightarrow{UV} .



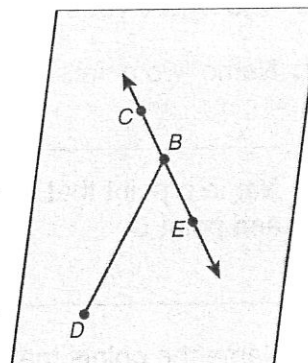
11. A constellation is a group of stars that people use to make a picture. The seven stars make the Big Dipper. Draw \overline{DE} , \overline{FE} , \overline{FG} , \overline{GH} , \overline{HI} , \overline{JG} , and \overline{JI} to complete the picture.



12. Points P and Q lie in a plane. Of \overline{PQ} , \overrightarrow{PQ} , or \overleftrightarrow{PQ} , name the one that has no endpoints.

LESSON **Practice B**
1-1 **Understanding Points, Lines, and Planes**

Use the figure for Exercises 1–7.



1. Name a plane. _____
2. Name a segment. _____
3. Name a line. _____
4. Name three collinear points.

5. Name three noncollinear points.

6. Name the intersection of a line and a segment not on the line. _____

7. Name a pair of opposite rays. _____

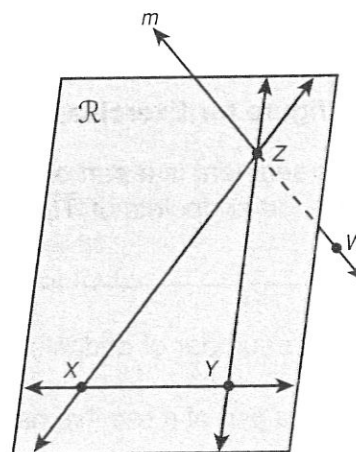
Use the figure for Exercises 8–11.

8. Name the points that determine plane \mathcal{R} .

9. Name the point at which line m intersects plane \mathcal{R} . _____

10. Name two lines in plane \mathcal{R} that intersect line m .

11. Name a line in plane \mathcal{R} that does not intersect line m . _____



Draw your answers in the space provided.

Michelle Kwan won a bronze medal in figure skating at the 2002 Salt Lake City Winter Olympic Games.

12. Michelle skates straight ahead from point L and stops at point M . Draw her path.
13. Michelle skates straight ahead from point L and continues through point M . Name a figure that represents her path. Draw her path.
14. Michelle and her friend Alexei start back to back at point L and skate in opposite directions. Michelle skates through point M , and Alexei skates through point K . Draw their paths.

MEASURING SEGMENTS

RULER POSTULATE: If points A and B are located on a NUMBER LINE, then . . .



$$AB = |x_2 - x_1|$$

where x_1 and x_2 are the coordinates of A and B

EXAMPLE 1:



$$QR =$$

EXAMPLE 2:



$$WX =$$

SEGMENT ADDITION POSTULATE:

- 1) You can add the lengths of two (or more) small segments to find the length of the larger segment.
- 2) If B is between A and C, then $AB + BC = AC$.

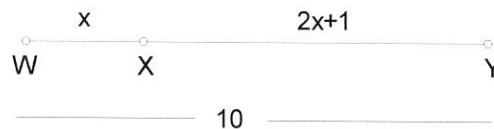


EXAMPLE 1:



$$QS =$$

EXAMPLE 2:



Find x and then find XY .

3:

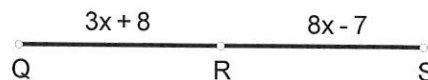
$$EG = 56 \text{ cm}$$



Find: $x =$ _____

4:

$$QS = 13x - 11$$



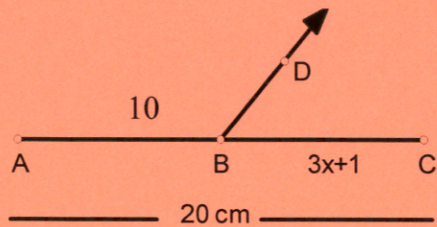
a) Find x .

b) Find SQ .

5

a) Find x .

b) Find BC .



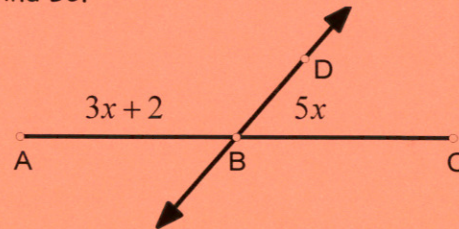
6

$AC = 26$ inches

a) Find x

b) Find AB .

c) Find BC .



CONGRUENT SEGMENTS: Segments that have the SAME or EQUAL LENGTH.

** The symbol for congruent is \cong .

** To show that segments are congruent, we use tick marks.

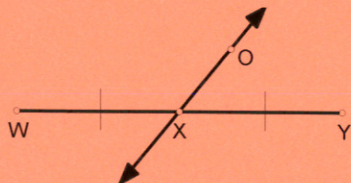
** If $\overline{AB} \cong \overline{CD}$, then $AB = CD$.

MIDPOINT: A point that divides a segment into two \cong segments.

Theorem	Description	Picture
Midpoint Theorem	If M is the midpoint of \overline{AB} , then $\overline{AM} \cong \overline{MB}$	

SEGMENT BISECTOR: A geometric figure that divides a segment into two congruent parts,

EX:



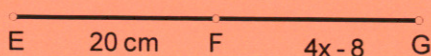
\overline{XO} bisects \overline{WY}

OR

\overline{XO} is a segment bisector

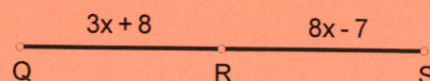
EXAMPLE #1:

F is the midpoint of \overline{EG} . Find x .



EXAMPLE #2:

R is the midpoint of \overline{QS} . Find x . Find SQ .

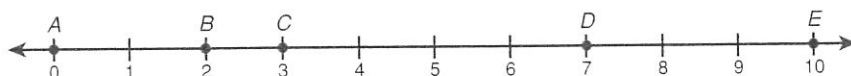


LESSON
1-2
Practice A
Measuring and Constructing Segments

Complete the statements.

- The number a point corresponds to on a number line is called its _____.
- The _____ between any two points on a number line is the absolute value of the difference of the coordinates.

Find the coordinate of each point.



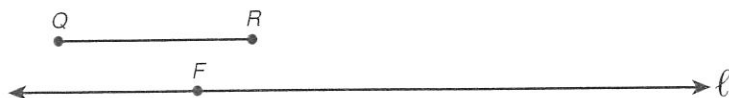
- D _____
- B _____
- A _____

Find each length.

- DB _____
- BC _____
- AE _____

Complete the exercises.

- Congruent segments are segments that have the same _____.
- Use a compass to construct \overline{FG} on line ℓ congruent to \overline{QR} .



- Point K is the midpoint of \overline{JL} , and $KL = 4$. Find JK . _____



A driver heading south on Highway 1 from Homestead, Florida, sees this road sign:

Key Largo	25
Islamorada	45
Key West	138

- Find the distance in miles from Key Largo to Key West. _____
- Find the distance in miles to the midpoint between Key Largo and Islamorada.

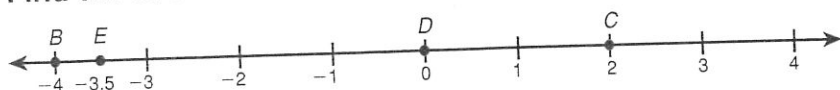
LESSON 1-2 Practice B
Measuring and Constructing Segments

Draw your answer in the space provided.

1. Use a compass and straightedge to construct \overline{XY} congruent to \overline{UV} .



Find the coordinate of each point.



2. D _____

3. C _____

4. E _____

Find each length.

5. BE _____

6. DB _____

7. EC _____

For Exercises 8–11, H is between I and J .

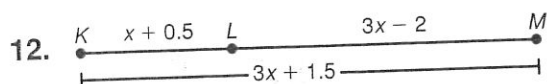
8. $HI = 3.9$ and $HJ = 6.2$. Find IJ . _____

9. $JI = 25$ and $IH = 13$. Find HJ . _____

10. H is the midpoint of \overline{IJ} , and $IH = 0.75$. Find HJ . _____

11. H is the midpoint of \overline{IJ} , and $IJ = 9.4$. Find IH . _____

Find the measurements.

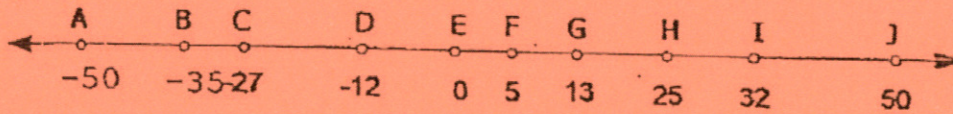


Find LM . _____

13. A pole-vaulter uses a 15-foot-long pole. She grips the pole so that the segment below her left hand is twice the length of the segment above her left hand. Her right hand grips the pole 1.5 feet above her left hand. How far up the pole is her right hand?
- _____

FINDING THE LENGTH OF SEGMENTS WITHOUT USING A RULER

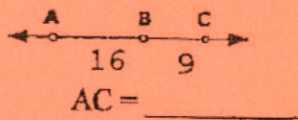
PART 1: FINDING THE LENGTH OF SEGMENTS USING A NUMBER LINE.



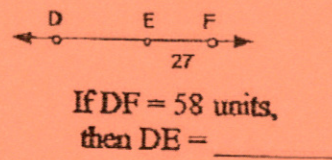
1. $EG =$ _____ 2. $IG =$ _____ 3. $HD =$ _____ 4. $BG =$ _____ 5. $AC =$ _____ 6. $BD =$ _____

PART 2: THE SEGMENT ADDITION POSTULATE.

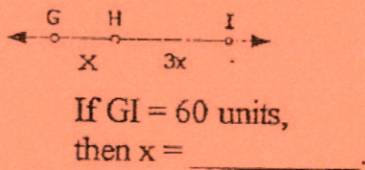
7.



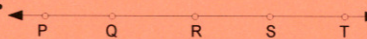
8.



9.



10.



- $\overline{PR} \cong \overline{RT}$
- S is the midpoint of \overline{RT}
- $QR = 4$ units
- $ST = 5$ units

$RS =$ _____ $RT =$ _____

$PR =$ _____ $PQ =$ _____

11.



- E is the midpoint of \overline{DF}
- $DE = 5x + 3$
- $EF = 33$

$x =$ _____

12. Point R lies between S & T.

- $ST = 79$ units
- $RS = 4y - 1$
- $RT = 7y + 3$

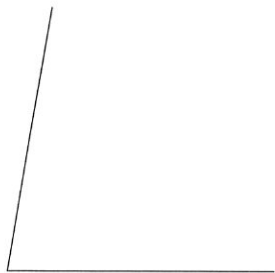
$RS =$ _____ $RT =$ _____

Angles and Their Measures

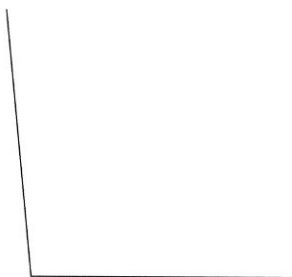
Date _____ Period _____

Find the measure of each angle to the nearest degree.

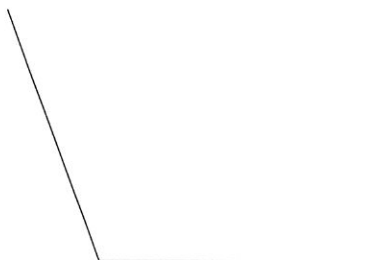
1)



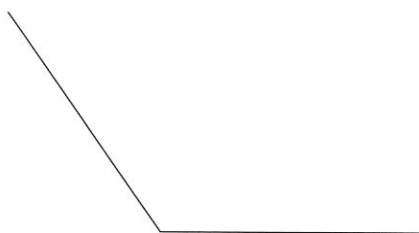
2)



3)



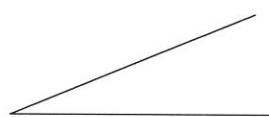
4)



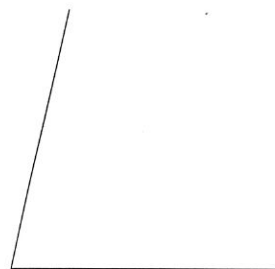
5)



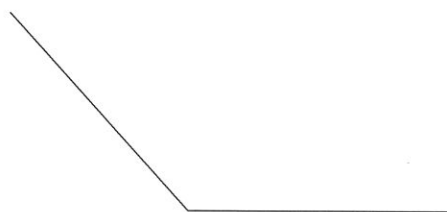
6)



7)



8)



9)



10)



Draw an angle with the given measurement.

11) 90°

12) 70°



13) 120°

14) 105°



15) 31°

16) 166°



17) 144°

18) 53°



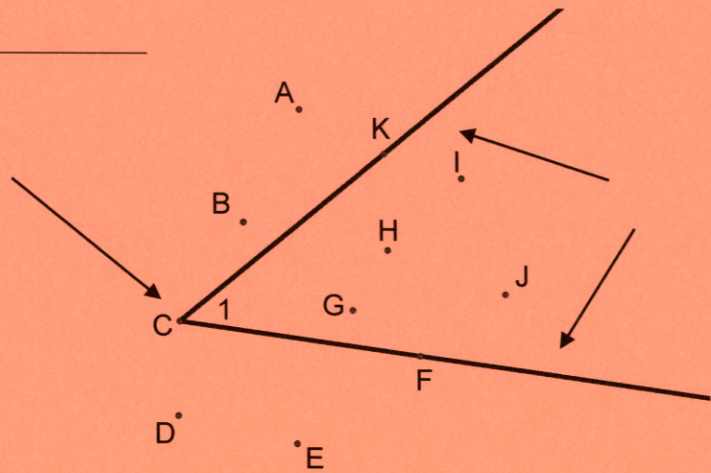
ANGLES AND THEIR MEASURES

Angle: _____

Vertex: _____

Each ray is a **side** of the angle.

- Interior of an angle:
- Exterior of an angle:



3 Ways to Name an Angle

1.

2.

3.

Measuring an Angle

- * The measure of an angle is found using a _____.
- * Angles are measured in _____.
- * The measure of $\angle A$ is denoted by _____.

CONGRUENT ANGLES:

ANGLE ADDITION POSTULATE:

Types of Angles

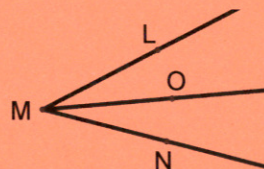
1. Acute Angle:
2. Right Angle:
3. Obtuse Angle:
4. Straight Angle:
5. Adjacent Angles:

ANGLE BISECTOR:

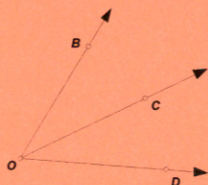
Theorem	Description	Picture
Angle Bisector Theorem	If \overrightarrow{BX} is the bisector of $\angle ABC$, then $\angle ABX \cong \angle XBC$	

EXAMPLES:

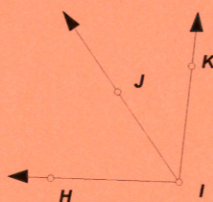
1. Name all the angles in the diagram at right.



2. If $m\angle BOC = 22^\circ$ and $m\angle BOD = 50^\circ$, then what is the measure of $\angle COD$?



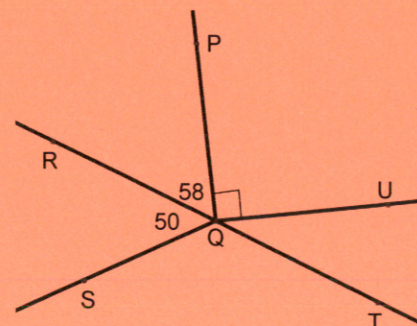
3. $m\angle KIJ = (2x + 6)^\circ$, $m\angle HIJ = (8x - 4)^\circ$, and $m\angle KIH = 62^\circ$. Find $m\angle KIJ$ & $m\angle HIJ$.



4. Y is a point in the interior of $\angle AOB$. Draw a sketch. Name the two adjacent angles.

5. Using the figure at right, find examples of each of the following types of angles.

- 2 acute angles:
- 1 right angle:
- 2 obtuse angle:
- 1 straight angle:
- 1 pair of adjacent angles:



LESSON 1-3 Practice A
Measuring and Constructing Angles

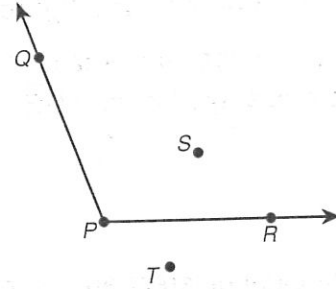
Use the figure for Exercises 1–4.

1. An angle is a figure formed by two rays with a common endpoint called the _____.

2. Name the two rays that form $\angle P$.

3. Use the angle symbol and three letters to name $\angle P$ in two ways.

4. Name a point that is in the interior of $\angle P$.



Complete the statement.

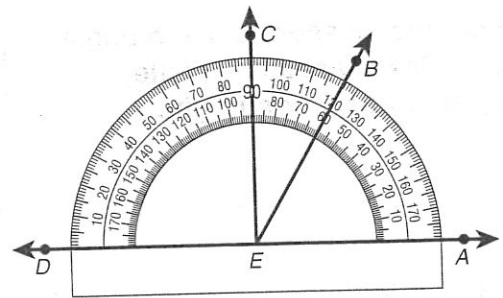
5. A tool used to measure and draw angles is called a _____.

Find the measure of each angle. Then tell whether each is acute, right, obtuse, or straight.

6. $\angle CEA$

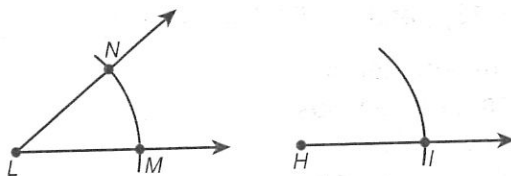
7. $\angle AEB$

8. $\angle DEA$



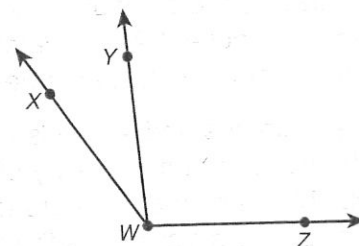
Complete the angle.

9. Use a compass and straightedge to finish constructing $\angle IHJ$ congruent to $\angle MLN$.



10. Marc doesn't think that the angle of the front seat in his mom's car is very cool, so he tilts the seat back. $m\angle ZWY = 95^\circ$ and $m\angle YWX = 30^\circ$.

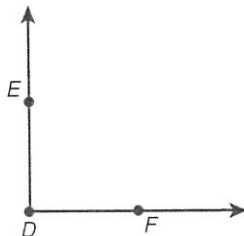
Find $m\angle ZWX$. _____



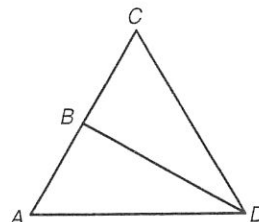
LESSON 1-3 Practice B **Measuring and Constructing Angles**

Draw your answer on the figure.

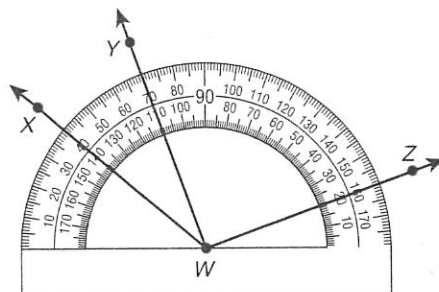
- Use a compass and straightedge to construct angle bisector \overrightarrow{DG} .



- Name eight different angles in the figure.



Find the measure of each angle and classify each as acute, right, obtuse, or straight.



- $\angle YWZ$

- $\angle XWZ$

- $\angle YWX$

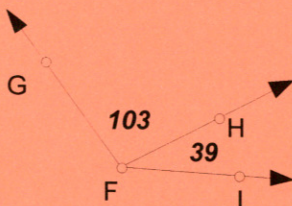
T is in the interior of $\angle PQR$. Find each of the following.

- $m\angle PQT$ if $m\angle PQR = 25^\circ$ and $m\angle RQT = 11^\circ$. _____
- $m\angle PQR$ if $m\angle PQR = (10x - 7)^\circ$, $m\angle RQT = 5x^\circ$, and $m\angle PQT = (4x + 6)^\circ$. _____
- $m\angle PQR$ if \overrightarrow{QT} bisects $\angle PQR$, $m\angle RQT = (10x - 13)^\circ$, and $m\angle PQT = (6x + 1)^\circ$. _____
- Longitude is a measurement of position around the equator of Earth. Longitude is measured in degrees, minutes, and seconds. Each degree contains 60 minutes, and each minute contains 60 seconds. Minutes are indicated by the symbol ' and seconds are indicated by the symbol ". Williamsburg, VA, is located at $76^\circ 42' 25''$. Roanoke, VA, is located at $79^\circ 57' 30''$. Find the difference of their longitudes in degrees, minutes, and seconds. _____
- To convert minutes and seconds into decimal parts of a degree, divide the number of minutes by 60 and the number of seconds by 3,600. Then add the numbers together. Write the location of Roanoke, VA, as a decimal to the nearest thousandths of a degree. _____

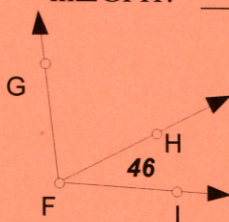
ANGLES PRACTICE:

PART 1: Use the Angle Addition Postulate to answer the following questions.

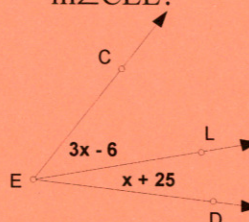
4. $m\angle GFI = \underline{\hspace{2cm}}$



5. If $m\angle GFI = 93^\circ$, what is $m\angle GFH$? $\underline{\hspace{2cm}}$



6. If $m\angle CED = 39^\circ$, what is $m\angle CEL$? $\underline{\hspace{2cm}}$



7. $m\angle FUR = \underline{\hspace{2cm}}$

$m\angle TUE = \underline{\hspace{2cm}}$

$\angle TUE \cong \angle \underline{\hspace{2cm}}$

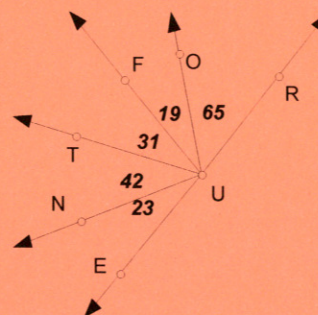
$m\angle NUF = \underline{\hspace{2cm}}$

$m\angle OUT = \underline{\hspace{2cm}}$

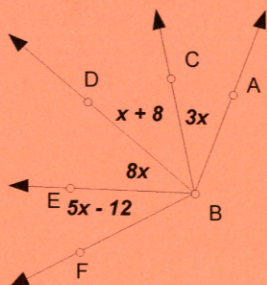
$m\angle EUR = \underline{\hspace{2cm}}$

$m\angle RUN = \underline{\hspace{2cm}}$

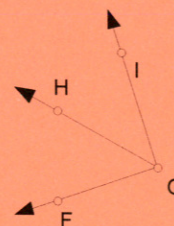
$m\angle FUE = \underline{\hspace{2cm}}$



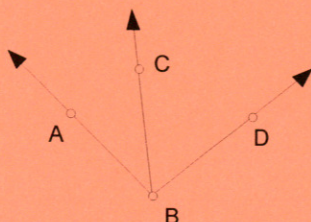
8. $m\angle CBE = 80^\circ$. Find $m\angle ABF$.



9. $m\angle IGH = (2x + 5)^\circ$, $m\angle FGH = (13x - 3)^\circ$, and $m\angle IGF = 62^\circ$. Find the value of x .



10. $m\angle DBC = (2x + 10)^\circ$, $m\angle ABC = (5x - 3)^\circ$, and $m\angle DBA = 70^\circ$. Find $m\angle DBC$ and $m\angle ABC$.



12. \overrightarrow{KM} bisects $\angle JKL$.
 $m\angle JKM = (3x + 12)^\circ$
 $m\angle MKL = 41^\circ$
Find x .

13. \overrightarrow{BD} bisects $\angle ABC$.
 $m\angle ABD = (4x + 6)^\circ$
 $m\angle DBC = (7x - 12)^\circ$
Find x .
Find $m\angle ABC$.

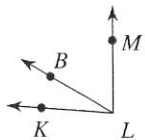
PART 2: REVIEW OF THE SEGMENT ADDITION POSTULATE. Use the Segment Addition Postulate to answer the following questions.

14. Let A be between B and C. Solve for p , given the following information.
 $BA = 4p - 18$
 $AC = 6p - 12$
 $BC = 40$
15. Let F be between G and H. Find the length of all three segments, given the following information.
 $GF = 6n - 45$
 $FH = 7n - 30$
 $GH = 2n + 46$

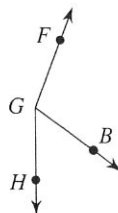
The Angle Addition Postulate

Date _____ Period _____

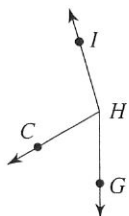
- 1) Find $m\angle KLM$ if $m\angle KLB = 26^\circ$
and $m\angle BLM = 60^\circ$.



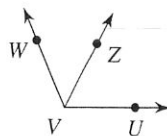
- 2) Find $m\angle FGH$ if $m\angle FGB = 105^\circ$
and $m\angle BGH = 54^\circ$.



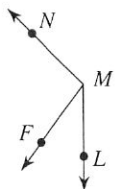
- 3) $m\angle GHC = 60^\circ$ and $m\angle CHI = 104^\circ$.
Find $m\angle GHI$.



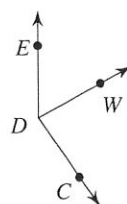
- 4) Find $m\angle WVU$ if $m\angle ZVU = 62^\circ$
and $m\angle WVZ = 50^\circ$.



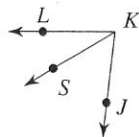
- 5) $m\angle FMN = 99^\circ$ and $m\angle LMF = 36^\circ$.
Find $m\angle LMN$.



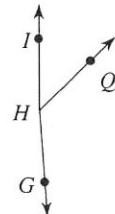
- 6) Find $m\angle WDC$ if $m\angle EDC = 145^\circ$
and $m\angle EDW = 61^\circ$.



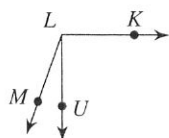
- 7) Find $m\angle JKL$ if $m\angle SKL = 31^\circ$
and $m\angle JKS = 52^\circ$.



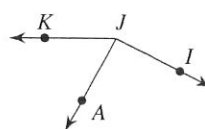
- 8) Find $m\angle IHQ$ if $m\angle IHG = 176^\circ$
and $m\angle QHG = 130^\circ$.



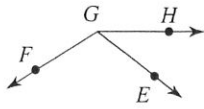
- 9) Find $m\angle KLU$ if $m\angle ULM = 20^\circ$
and $m\angle KLM = 110^\circ$.



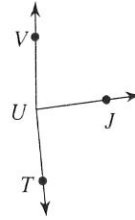
- 10) Find $m\angle IJA$ if $m\angle AJK = 61^\circ$
and $m\angle IJK = 153^\circ$.



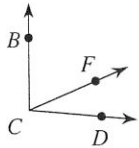
- 11) $m\angle HGF = 16x + 4$, $m\angle EGF = 110^\circ$,
and $m\angle HGE = 3x + 11$. Find x .



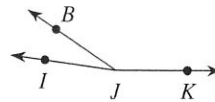
- 12) $m\angle VUT = 175^\circ$, $m\angle VUJ = 17x - 3$,
and $m\angle JUT = 17x + 8$. Find x .



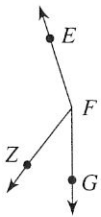
- 13) $m\angle FCD = x + 41$, $m\angle BCF = x + 78$,
and $m\angle BCD = 95^\circ$. Find x .



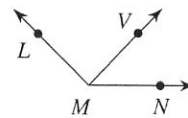
- 14) Find x if $m\angle BJK = 146 + 2x$,
 $m\angle IJK = 172^\circ$, and $m\angle IJB = 2x + 26$.



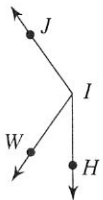
- 15) $m\angle GFZ = 38^\circ$, $m\angle ZFE = 2x + 125$,
and $m\angle GFE = x + 163$. Find x .



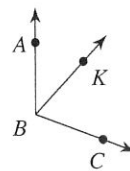
- 16) Find x if $m\angle LMN = 135^\circ$,
 $m\angle LMV = -1 + 45x$, and $m\angle VMN = 23x$.



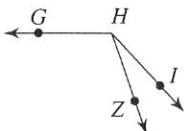
- 17) Find $m\angle HIW$ if $m\angle WIJ = 10x$,
 $m\angle HIJ = 145^\circ$, and $m\angle HIW = 2x + 13$.



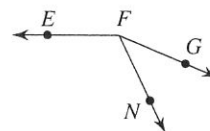
- 18) $m\angle ABC = 17x + 8$, $m\angle ABK = 42^\circ$,
and $m\angle KBC = 12x - 4$. Find $m\angle ABC$.



- 19) $m\angle ZHG = 11x - 1$, $m\angle IHZ = 24^\circ$,
and $m\angle IHG = 12x + 13$. Find $m\angle IHG$.



- 20) $m\angle GFN = 4x + 10$, $m\angle NFE = 14x + 3$,
and $m\angle GFE = 157^\circ$. Find $m\angle NFE$.



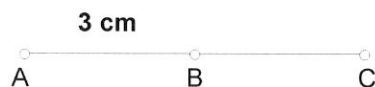
Name: _____

Date: _____

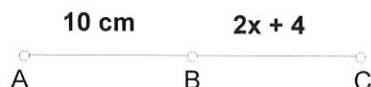
Sections 1.1 to 1.3 Practice

PART 1: SEGMENT AND ANGLE BISECTORS. In each problem below, B is the midpoint of \overline{AC} or \overline{BD} bisects $\angle ABC$. Find the specified value or length.

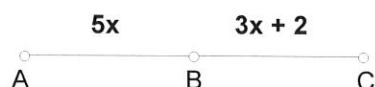
1. Find AC.



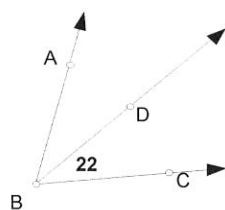
2. Find x.



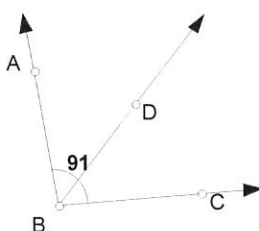
3. Find AC.



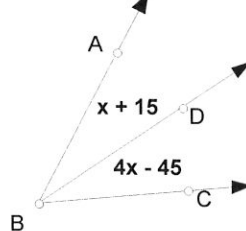
4. Find $m\angle ABC$.



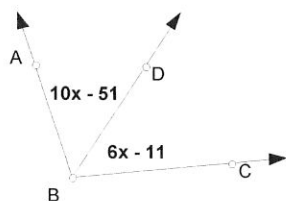
5. Find $m\angle ABD$.



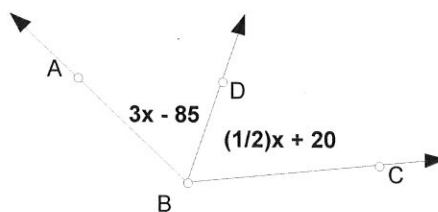
6. Find x.



7. Find x.



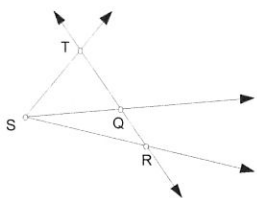
8. Find x.



Turn over →

PART 2: Answer each of the following review questions.

9. Name three points that are collinear.



A. Points T, Q, and S

B. Points S, Q, and R

C. Points T, Q, and R

D. Points T, S, and R

10. \overrightarrow{PR} is represented by which sketch?

A.



B.



C.



D.



11. The notation for the length of a segment between P and Q is ____.

A. \overrightarrow{QP}

B. PQ

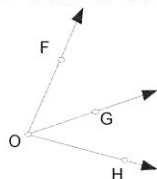
C. \overline{PQ}

D. \overleftrightarrow{PQ}

12. If $AB = 13$ and $AC = 27$, what is BC ?

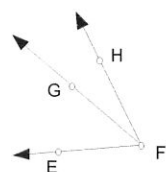


13. If $m\angle FOH = 58^\circ$ and $m\angle FOG = 30^\circ$, then what is $m\angle GOH$?



14. If F is between G and H, $GF = 5x + 28$, $FH = 7x + 20$, and $GH = 48$ cm, what is the value of x ?

15. $m\angle HFG = (2x + 6)^\circ$, $m\angle EFG = (12x - 1)^\circ$, and $m\angle HFE = 61^\circ$. What is $m\angle EFG$?

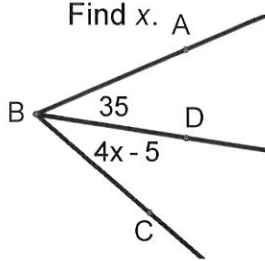


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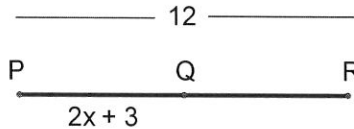
Date: _____

More Practice with Midpoints and Bisectors**DIRECTIONS:** Use the given information and pictures to solve each problem below. Show your work. Circle your final answers.

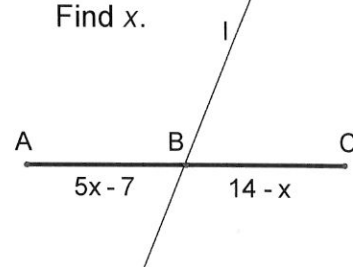
- 1.
- \overrightarrow{BD}
- bisects
- $\angle ABC$
- .

Find x .

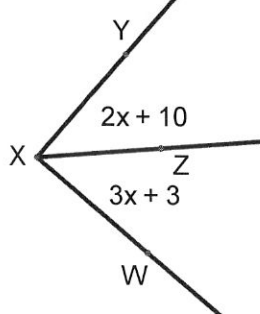
2. Q is the midpoint of
- \overline{PR}
- .

Find x .

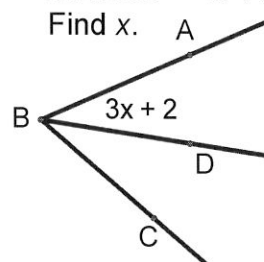
- 3.
- ℓ
- bisects
- \overline{AC}
- .

Find x .

- 4.
- \overrightarrow{XZ}
- bisects
- $\angle YXW$
- .

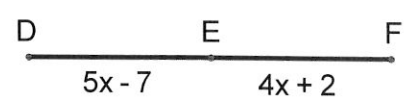
Find x .

- 5.
- \overrightarrow{BD}
- bisects
- $\angle ABC$
- .

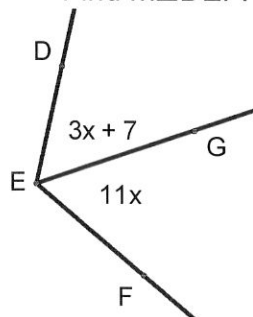
 $m\angle ABC = 4x + 12$.Find x .

6. E is the midpoint of
- \overline{DF}
- .

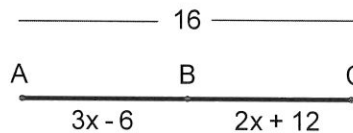
Find DF.



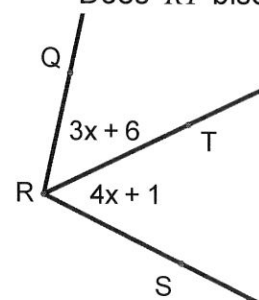
- 7.
- \overrightarrow{EG}
- bisects
- $\angle DEF$
- .

Find $m\angle DEF$.

8. Is B the midpoint?



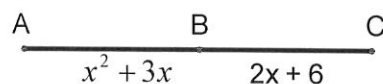
- 9.
- $m\angle QRS = 42^\circ$
- .

Does \overrightarrow{RT} bisect $\angle QRS$?

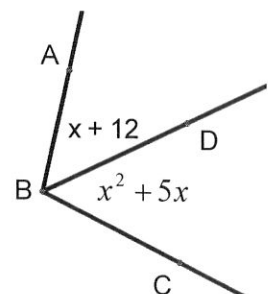
10. B is the midpoint of
- \overline{AC}
- .

Find x .

Find AC.



- 11.
- \overrightarrow{BD}
- bisects
- $\angle ABC$
- .

Find x .

Name: _____

Date: _____

SECTION 1.4 – PAIRS OF ANGLES

(p. 28 – 33)

DEFINITIONS

1) COMPLEMENTARY ANGLES –

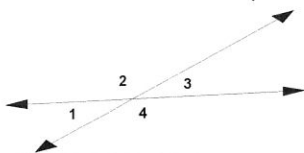
COMPLEMENTS –

2) SUPPLEMENTARY ANGLES –

SUPPLEMENTS –

3) LINEAR PAIRS –

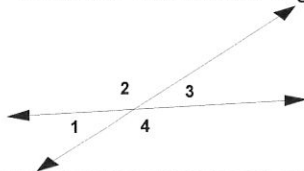
EX: $\angle 1$ and $\angle 2$ are linear pairs
 $\angle 2$ and $\angle 3$ are linear pairs
 $\angle 3$ and $\angle 4$ are linear pairs
 $\angle 4$ and $\angle 1$ are linear pairs



LINEAR PAIRS POSTULATE –

4) VERTICAL ANGLES –

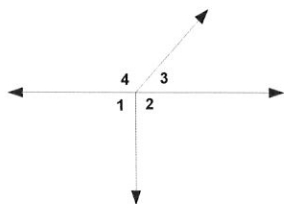
EX: $\angle 1$ and $\angle 3$ are vertical angles
 $\angle 2$ and $\angle 4$ are vertical angles



VERTICAL ANGLE THEOREM –

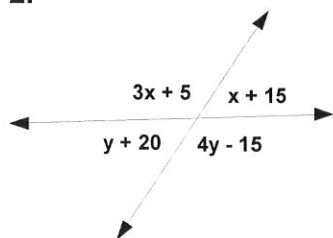
PRACTICE PROBLEMS

1)



- Are $\angle 2$ and $\angle 3$ linear pairs? Why or why not?
- Are $\angle 3$ and $\angle 4$ linear pairs? Why or why not?
- Are $\angle 1$ and $\angle 3$ vertical angles? Why or why not?

2.



- What is the value of x ?
- What is the value of y ?

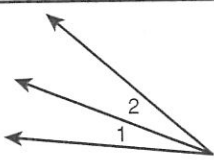
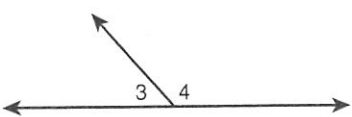

3. $m\angle A = 50^\circ$
 $m\angle B = 19^\circ$
 $m\angle C = 110^\circ$

- What is the measure of the complement of $\angle A$? _____
- What is the measure of the supplement of $\angle A$? _____
- What is the measure of the complement of $\angle B$? _____
- What is the measure of the supplement of $\angle B$? _____
- What is the measure of the complement of $\angle C$? _____
- What is the measure of the supplement of $\angle C$? _____

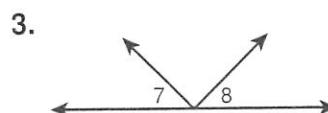
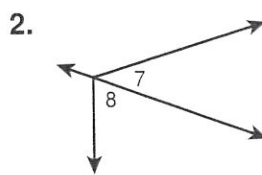
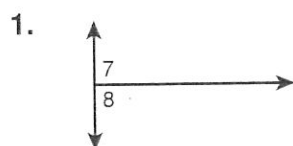
4. $\angle A$ and $\angle B$ are complementary angles. $m\angle A = 5x + 8$ and $m\angle B = x + 4$. Find the measure of each angle.

5. $\angle T$ and $\angle S$ are supplementary angles. $m\angle T$ is half the measure of $\angle S$. Find the measures of each angle.

LESSON
1-4
Reteach
Pairs of Angles

Angle Pairs		
Adjacent Angles	Linear Pairs	Vertical Angles
have the same vertex and share a common side	adjacent angles whose noncommon sides are opposite rays	nonadjacent angles formed by two intersecting lines
 <p>$\angle 1$ and $\angle 2$ are adjacent.</p>	 <p>$\angle 3$ and $\angle 4$ are adjacent and form a linear pair.</p>	 <p>$\angle 5$ and $\angle 6$ are vertical angles.</p>

Tell whether $\angle 7$ and $\angle 8$ in each figure are only adjacent, are adjacent and form a linear pair, or are not adjacent.

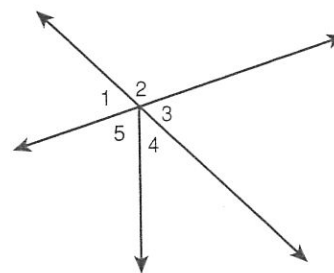


Tell whether the indicated angles are only adjacent, are adjacent and form a linear pair, or are not adjacent.

4. $\angle 5$ and $\angle 4$ _____

5. $\angle 1$ and $\angle 4$ _____

6. $\angle 2$ and $\angle 3$ _____

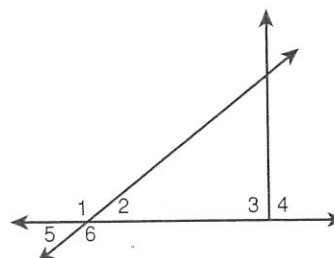


Name each of the following.

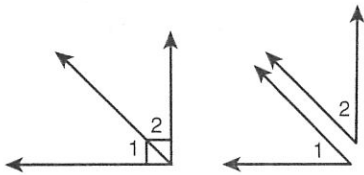
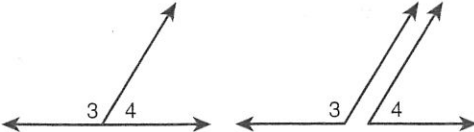
7. a pair of vertical angles _____

8. a linear pair _____

9. an angle adjacent to $\angle 4$ _____

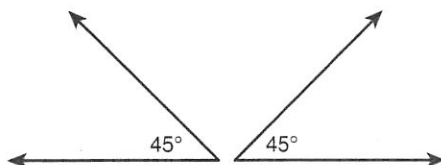


LESSON
1-4
Reteach
Pairs of Angles continued

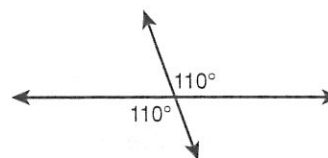
Angle Pairs	
Complementary Angles	Supplementary Angles
sum of angle measures is 90°	sum of angle measures is 180°
 <p>$m\angle 1 + m\angle 2 = 90^\circ$</p> <p>In each pair, $\angle 1$ and $\angle 2$ are complementary.</p>	 <p>$m\angle 3 + m\angle 4 = 180^\circ$</p> <p>In each pair, $\angle 3$ and $\angle 4$ are supplementary.</p>

Tell whether each pair of labeled angles is complementary, supplementary, or neither.

10.

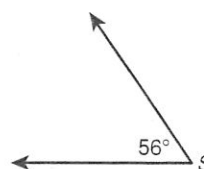


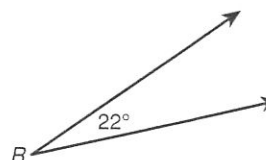
11.



Find the measure of each of the following angles.

12. complement of $\angle S$ _____

13. supplement of $\angle S$ _____

14. complement of $\angle R$ _____

15. supplement of $\angle R$ _____


16. $\angle LMN$ and $\angle UVW$ are complementary. Find the measure of each angle if $m\angle LMN = (3x + 5)^\circ$ and $m\angle UVW = 2x^\circ$.

LESSON
1-4 **Practice A**
Pairs of Angles

Complete the statements.

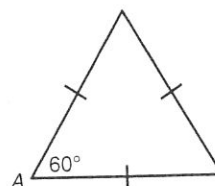
1. Adjacent angles are two angles in the same plane with a common _____ and a common _____, but no common interior points.
2. A _____ is a pair of adjacent angles whose noncommon sides are opposite rays.
3. Complementary angles are two angles whose measures have a sum of _____.
4. The kind of angle formed by the noncommon sides of two adjacent and complementary angles is a _____.
5. _____ angles are two angles whose measures have a sum of 180° .
6. The kind of angle formed by the noncommon sides of two adjacent and supplementary angles is a _____.

Draw your answer in the space provided.

7. Sketch $\angle 1$ and $\angle 2$ so that they are adjacent angles.
8. Sketch $\angle 1$ and $\angle 2$ so that they form a linear pair.

In an equilateral triangle, all three sides have equal lengths and all three angles have equal measures. Find the measure of the following angles.

9. supplement of $\angle A$ _____
10. complement of $\angle A$ _____



Draw your answer in the space provided.

11. Sketch $\angle 1$ and $\angle 2$ so that they are vertical angles.

LESSON
1-4
Practice B
Pairs of Angles

- $\angle PQR$ and $\angle SQR$ form a linear pair. Find the sum of their measures. _____
- Name the ray that $\angle PQR$ and $\angle SQR$ share. _____

Use the figures for Exercises 3 and 4.

- supplement of $\angle Z$ _____

- complement of $\angle Y$ _____



- An angle measures 12 degrees less than three times its supplement. Find the measure of the angle. _____
- An angle is its own complement. Find the measure of a supplement to this angle. _____

- $\angle DEF$ and $\angle FEG$ are complementary. $m\angle DEF = (3x - 4)^\circ$, and $m\angle FEG = (5x + 6)^\circ$.

Find the measures of both angles. _____

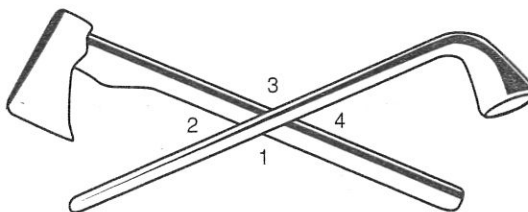
- $\angle DEF$ and $\angle FEG$ are supplementary. $m\angle DEF = (9x + 1)^\circ$, and $m\angle FEG = (8x + 9)^\circ$.

Find the measures of both angles. _____

Use the figure for Exercises 9 and 10.

In 2004, several nickels were minted to commemorate the Louisiana Purchase and Lewis and Clark's expedition into the American West. One nickel shows a pipe and a hatchet crossed to symbolize peace between the American government and Native American tribes.

- Name a pair of vertical angles.



- Name a linear pair of angles.

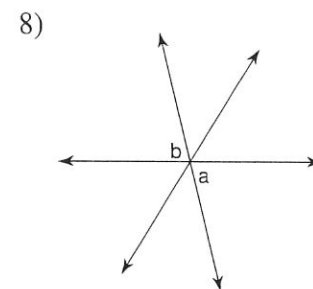
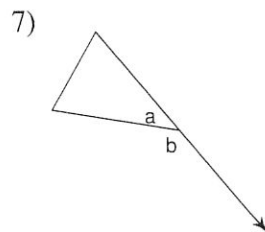
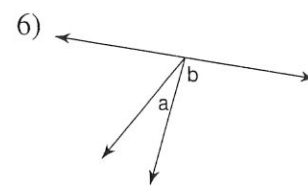
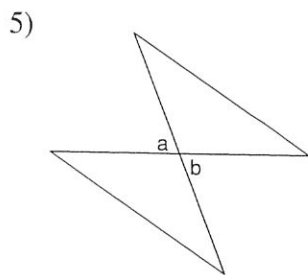
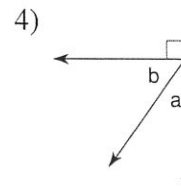
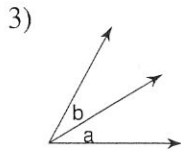
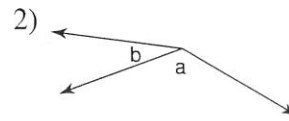
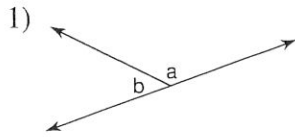
- $\angle ABC$ and $\angle CBD$ form a linear pair and have equal measures. Tell if $\angle ABC$ is acute, right, or obtuse.

- $\angle KLM$ and $\angle MLN$ are complementary. \overrightarrow{LM} bisects $\angle KLN$. Find the measures of $\angle KLM$ and $\angle MLN$.

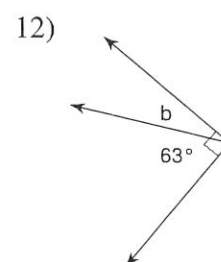
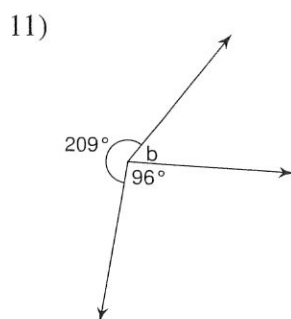
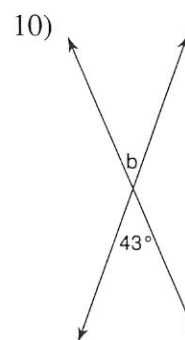
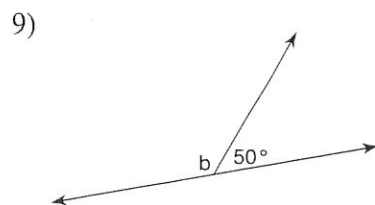
Angle Pair Relationships

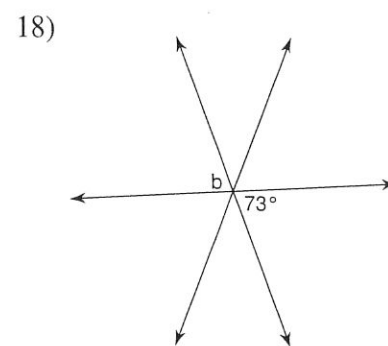
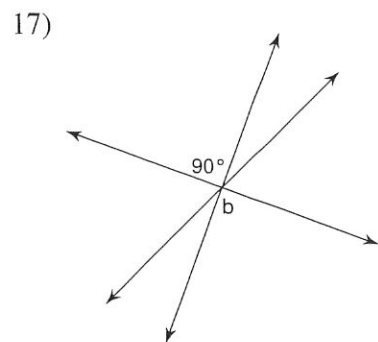
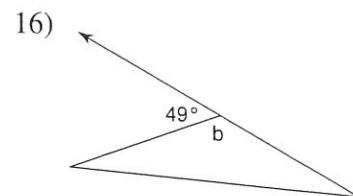
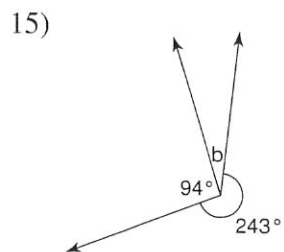
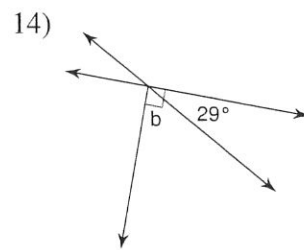
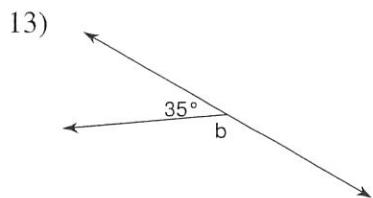
Date _____ Period _____

Name the relationship: complementary, linear pair, vertical, or adjacent.

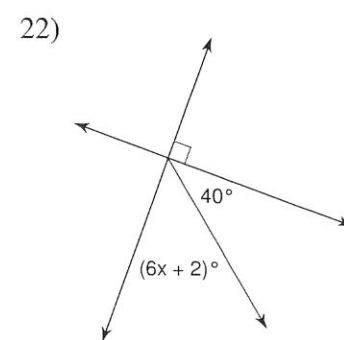
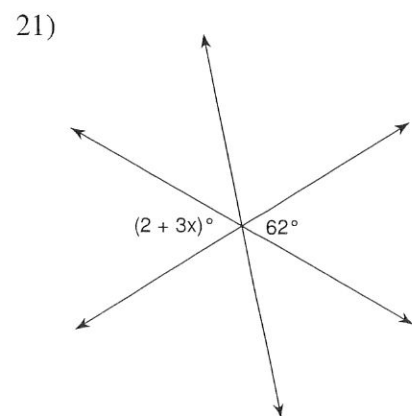
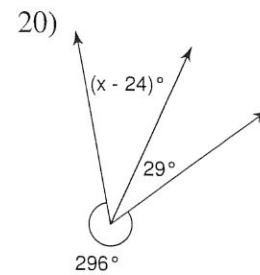
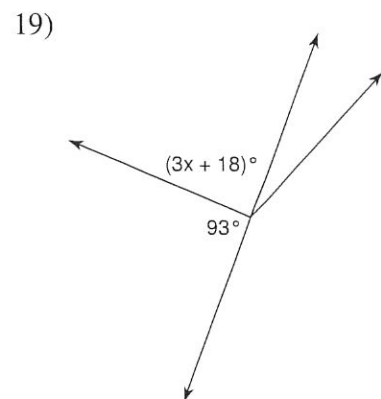


Find the measure of angle b.





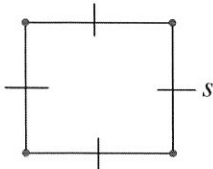
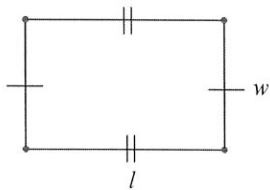
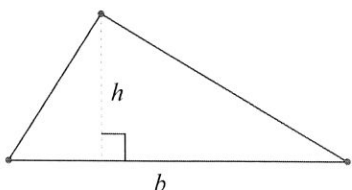
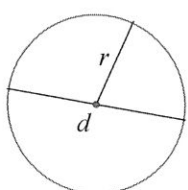
Find the value of x.



Name _____

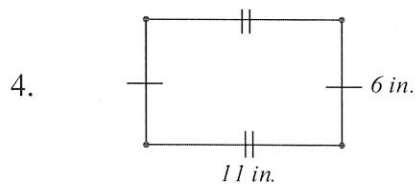
Date _____

Section 1.5 – Area Notes

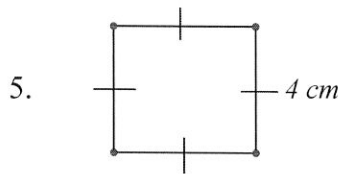
<u>Square</u>	<u>Rectangle</u>	<u>Triangle</u>	<u>Circle</u>
 <p>$s = \text{side}$</p>	 <p>$l = \text{length}$ $w = \text{width}$</p>	 <p>$h = \text{height}$ $b = \text{base}$</p>	 <p>$d = \text{diameter}$ $r = \text{radius}$</p>
Area = s^2	Area = $l w$	Area = $(\frac{1}{2})bh$	Area = πr^2
Perimeter = $4s$	Perimeter = $2l + 2w$		Circumference = $\pi d = 2\pi r$

I. Fill-In the Blank:

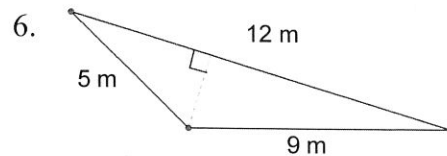
1. The perimeter is the distance _____ a figure.
2. The circumference is the distance around a _____.
3. The _____ is the number of square unities needed to cover the figure.

II. Find the Perimeter:

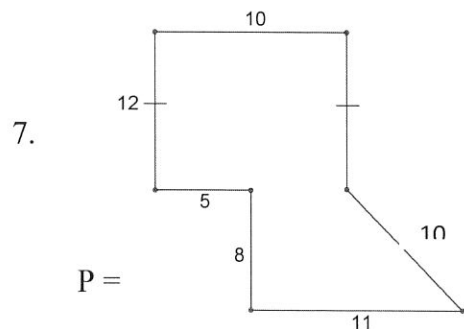
P =



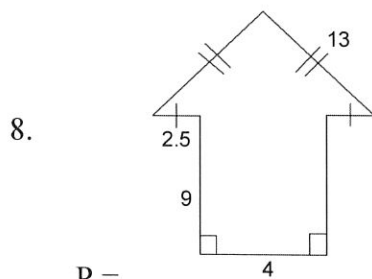
P =



P =



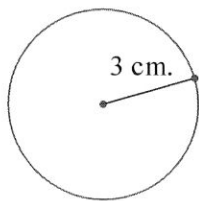
P =



P =

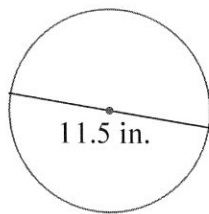
III. Find the Circumference:

9.



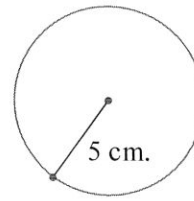
C =

10.



C =

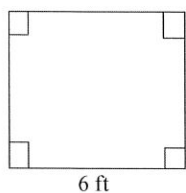
11.



C =

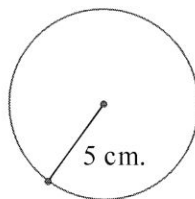
IV. Find the Area:

12.



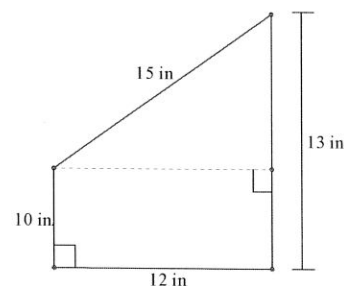
A =

13.



A =

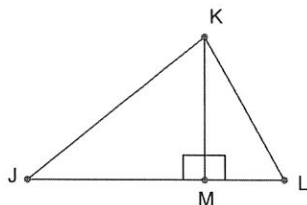
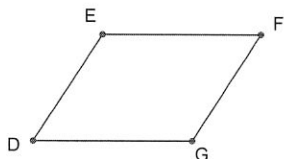
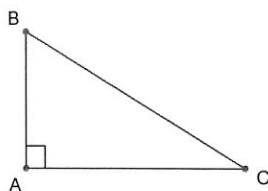
14.



A =

“Throw-Backs” Recall previous knowledge.

VI. Classify each angle as Acute, Obtuse, Right or Straight:



15. $\angle ABC$

16. $\angle BAC$

17. $\angle BCA$

18. $\angle DEF$

19. $\angle EFG$

20. $\angle EDG$

21. $\angle DGF$

22. $\angle JKM$

23. $\angle KML$

24. $\angle JML$

VI. Fill-In the Blank:

25. An _____ angle measures between 0° and 90° .

26. A right angle measures exactly _____.

27. An obtuse angle measures between _____ and _____.

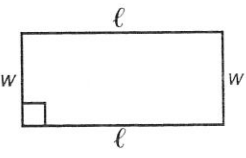
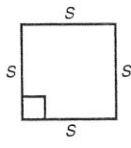
28. A _____ angle measures exactly 180° .

Additional Practice: Textbook pg. 38 #10-21

LESSON
Reteach
1-5 Using Formulas in Geometry

The **perimeter** of a figure is the sum of the lengths of the sides.

The **area** is the number of square units enclosed by the figure.

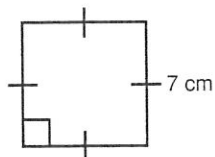
Figure	Rectangle	Square
Model		
Perimeter	$P = 2\ell + 2w$ or $2(\ell + w)$	$P = 4s$
Area	$A = \ell w$	$A = s^2$

Find the perimeter and area of each figure.

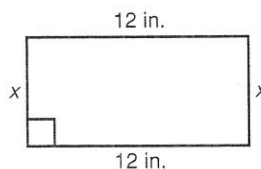
1. rectangle with $\ell = 4$ ft, $w = 1$ ft

2. square with $s = 8$ mm

3.

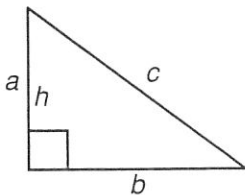
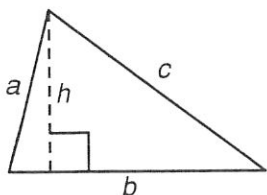


4.



The perimeter of a triangle is the sum of its side lengths.

The base and height are used to find the area.



Perimeter

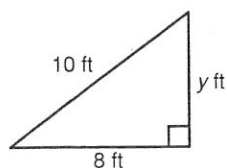
$$P = a + b + c$$

Area

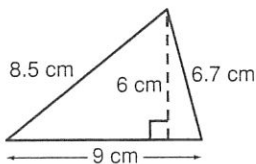
$$A = \frac{1}{2}bh \text{ or } \frac{bh}{2}$$

Find the perimeter and area of each triangle.

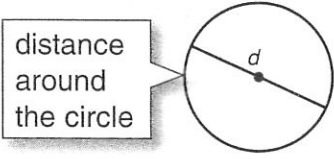
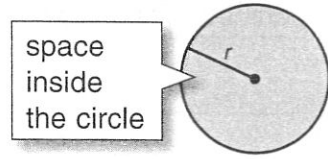
5.

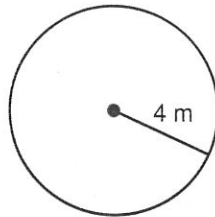


6.



LESSON **1-5** **Reteach** *Using Formulas in Geometry* continued

Circles		
	Circumference	Area
Models		
Words	pi times the diameter or 2 times pi times the radius	pi times the square of the radius
Formulas	$C = \pi d$ or $C = 2\pi r$	$A = \pi r^2$



$$C = 2\pi r$$

$$A = \pi r^2$$

$$C = 2\pi(4)$$

$$A = \pi(4)^2$$

$$C = 8\pi$$

$$A = 16\pi$$

$$C \approx 25.1 \text{ m}$$

$$A \approx 50.3 \text{ m}^2$$

Find the circumference and area of each circle. Use the π key on your calculator. Round to the nearest tenth.

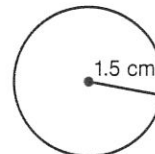
7. circle with a radius of 11 inches

8. circle with a diameter of 15 millimeters

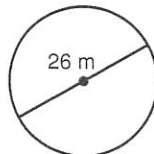
9.



10.



11.



12.

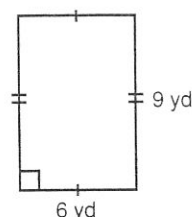


LESSON
1-5 Practice A
Using Formulas in Geometry**Complete the statements.**

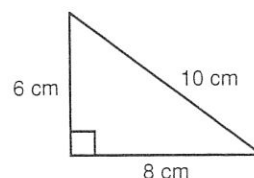
1. The sum of the _____ of a plane figure is called the perimeter.
2. Give the formula for the perimeter of a rectangle. _____
3. The _____ of a plane figure is the number of nonoverlapping square units of a given size that exactly cover the figure.
4. The formula for the area of a triangle is _____.

Use the figure for Exercises 5 and 6.

5. Find the perimeter of the rectangle. _____
6. Find the area of the rectangle. _____

**Use the figure for Exercises 7 and 8.**

7. Find the perimeter of the triangle. _____
8. Find the area of the triangle. _____

**Complete the statements.**

9. In a circle, a _____ is a segment that passes through the center of the circle and that has endpoints on the circle.
10. A radius of a circle is a segment whose endpoints are the _____ of the circle and a point on the circle.
11. The diameter of a circle is _____ the radius.

Draw your answer in the space provided.

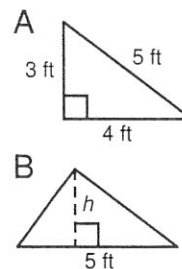
12. Sketch a circle and label the center, a diameter, and a radius.

13. Give the formula for the area of a circle. _____
14. The circumference of a circle is the distance _____ the circle.
15. Give the formula for the circumference of a circle. _____

LESSON **Practice B** **1-5** **Using Formulas in Geometry**

Use the figures for Exercises 1–3.

- Find the perimeter of triangle A. _____
- Find the area of triangle A. _____
- Triangle A is identical to triangle B.
Find the height h of triangle B. _____

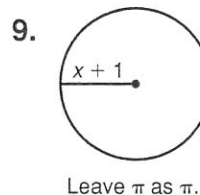
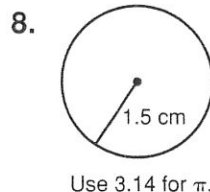
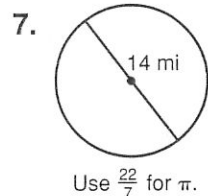


Find the perimeter and area of each shape.

- square with a side 2.4 m in length
- rectangle with length $(x + 3)$ and width 7

- Although a circle does not have sides, it does have a perimeter.
What is the term for the perimeter of a circle? _____

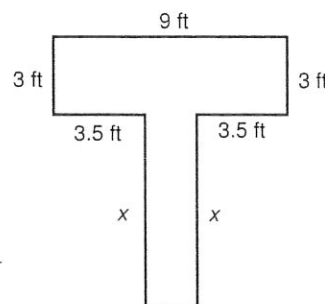
Find the circumference and area of each circle.



- The area of a square is $\frac{1}{4}$ in². Find the perimeter. _____
- The area of a triangle is 152 m², and the height is 16 m. Find the base. _____
- The circumference of a circle is 25π mm. Find the radius. _____

Use the figure for Exercises 13 and 14.

Lucas has a 39-foot-long rope. He uses all the rope to outline this T-shape in his backyard. All the angles in the figure are right angles.



- Find x . _____
- Find the area enclosed by the rope. _____

Name: _____

Date: _____

CHAPTER 1 REVIEW

Terminology, Rules, and Other Things You Should Know

3 Undefined Terms in Geometry

Ray

Segment

Angle

Bisector

Midpoint

Angle and Segment Addition Postulates

Distance between point on a # Line

How to name geometric figures

Acute Angle

Obtuse Angle

Right Angle

Straight Angle

Adjacent Angles

Linear Pairs

Collinear and Noncollinear

Area formulas

Vertical Angles

Vertex

Intersection

Congruent

Complementary

Supplementary

Coplanar

Postulate

Format of Test

Worth a Total of 76 Points.

42 Questions

Matching

True/False

Multiple-Choice

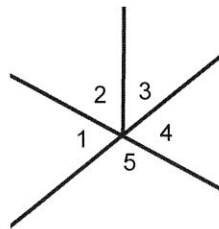
Short Answer

Always, Sometimes, or Never

Math Problems involving segments and \angle s

Practice Problems

Use this diagram to answer #1 – 3.



1. Which angles form a linear pair?

- A. $\angle 1$ and $\angle 2$ B. $\angle 1$ and $\angle 4$ C. $\angle 2$ and $\angle 3$ D. $\angle 3$ and $\angle 5$ E. $\angle 4$ and $\angle 5$

2. Which angles are vertical angles?

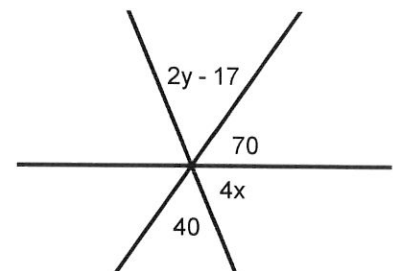
- A. $\angle 1$ and $\angle 2$ B. $\angle 1$ and $\angle 4$ C. $\angle 2$ and $\angle 3$ D. $\angle 3$ and $\angle 5$ E. $\angle 4$ and $\angle 5$

3. Which angles are supplementary?

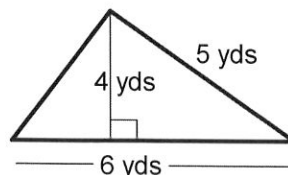
- A. $\angle 1$ and $\angle 4$ B. $\angle 4$ and $\angle 5$ C. $\angle 1$ and $\angle 5$ D. Both B and C E. All of these

4. Two angles are complementary. One angle has a measure that is twice the other angle. What is the measure of the larger angle?

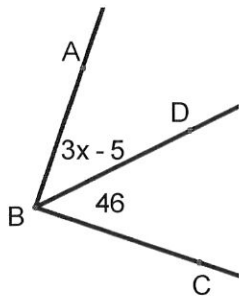
5. Using the figure at the right, find the value of y .



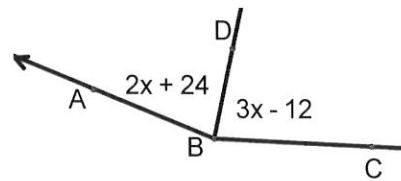
6. Find the area of the figure at right.



7. \overline{BD} bisects $\angle ABC$. Find the value of x .

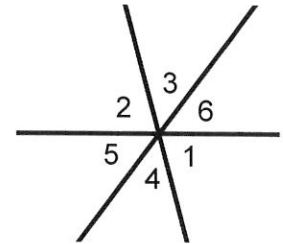


8. \overline{BD} bisects $\angle ABC$. Find the value of x .



9. Use the diagram at right to complete each statement.

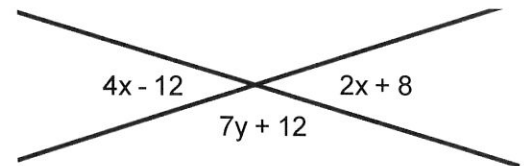
- A. If $m\angle 1 = 37^\circ$, then $m\angle 2 = \underline{\hspace{2cm}}$.
 B. If $m\angle 4 = 72^\circ$ and $m\angle 5 = 43^\circ$, then $m\angle 1 = \underline{\hspace{2cm}}$.
 C. If $m\angle 2 = m\angle 6 = x^\circ$, then $m\angle 3 = \underline{\hspace{2cm}}$.



10. Find the value of x and y .

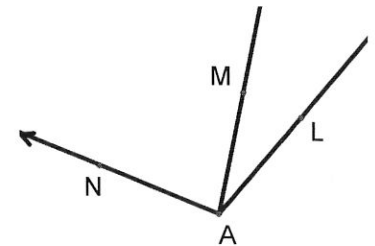
$x = \underline{\hspace{2cm}}$

$y = \underline{\hspace{2cm}}$



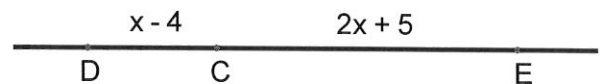
11. In the figure at right, $m\angle MAN = 17x + 3$, $m\angle MAL = 9(x - 3)$, and $m\angle NAL = 3(7x + 2)$.

- A. Find x . $\underline{\hspace{2cm}}$
 B. Find $m\angle MAN$. $\underline{\hspace{2cm}}$
 C. Find $m\angle NAL$. $\underline{\hspace{2cm}}$



12. If $DE = 91$, find the indicated values.

- A. $x = \underline{\hspace{2cm}}$
 B. $DC = \underline{\hspace{2cm}}$
 C. $CE = \underline{\hspace{2cm}}$



Answers to Practice/Review Problems

- | | | | |
|-----------------------|------------------|----------------|----------------|
| 1. E | 7. 17 | | |
| 2. B | 8. 36 | | |
| 3. D | 9. a. 37° | b. 65° | c. $180 - 2x$ |
| 4. 60° | 10. $x = 10$ | $y = 20$ | |
| 5. 28.5 | 11. a. 6 | b. 105° | c. 132° |
| 6. 12 yd ² | 12. a. 30 | b. 26 units | c. 65 units |

Introducing Points, Segments, Rays, and Lines

In this activity you'll experiment with drawing, dragging, measuring, and labeling points, segments, rays, and lines. These objects, along with circles, are the building blocks of most geometric constructions.

SKETCH AND INVESTIGATE: POINTS AND SEGMENTS

Note: If at any time you think you've made a mistake or you want to do something differently, you can always undo as many steps as you like. The **Undo** and **Redo** commands are in the Edit menu.



1. Choose the **Point** tool and click in the sketch to construct a point. Click again to construct a second point. Notice that the most recently constructed point is *selected*: It appears with an outline.



2. Choose the **Selection Arrow** tool and click in a blank area in the sketch. This deselects everything.



By default, point labels start with A.

3. Choose the **Text** tool. Position the finger over a point, then click to display that point's label. Display the other point's label, too.

A

B

4. With the **Selection Arrow** tool, click on both points. Now both points should be selected.

A

B

5. In the Measure menu, choose **Distance**.

$AB = 2.72$ cm

6. Drag one of the points and observe the measurement.

A

B

Q1 How can you make the distance between the two points zero?

7. Choose the **Segment** tool and draw a segment connecting the two points. You'll see a triple segment at first, indicating that the segment is selected.

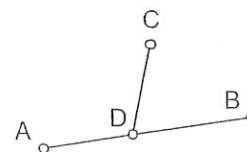


8. With the segment selected, go to the Measure menu and choose **Length**.

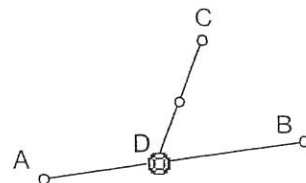
9. Use the **Selection Arrow** tool to drag either endpoint of the segment.

Q2 How does the length of a segment compare to the distance between its endpoints?

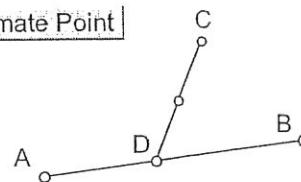
10. Use the **Segment** tool to construct a second segment with one endpoint attached to the first segment. To do this, click the mouse button first when the pointer is in a blank area of the sketch, then when it's directly on the original segment.



11. Use the **Text** tool to show the labels of this segment's endpoints.
 12. Use the **Selection Arrow** tool to drag point D to confirm that it is attached to \overline{AB} .
 13. Select \overline{CD} (the segment, not its endpoints), then go to the Construct menu and notice what choices are available. Choose **Midpoint**.
 14. Click in a blank area to deselect everything.
 15. Select point D .
 16. In the Edit menu, drag to the Action Buttons submenu and choose **Animation**. You'll get a dialog box you can use to specify animation settings. To choose the default settings, click OK. You've created an Animation action button in your sketch.
 17. Press the action button (by clicking on it) to start the animation.
 18. Press the button again to stop the animation.
 19. Select the midpoint; then, in the Display menu, choose **Trace Midpoint**.
 20. Press the Animation button again and observe the path that the midpoint traces.
- Q3** Describe the path that the midpoint traces as point D moves back and forth.

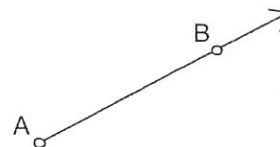


Animate Point



SKETCH AND INVESTIGATE: RAYS AND LINES

21. In the File menu, choose **New Sketch**.
 22. Press and hold down the mouse button on the **Segment** tool. A palette of **Straightedge** tools will pop out to the right. Drag right and choose the **Ray** tool.
 23. Draw a ray in your sketch. Notice that the ray extends in one direction beyond the edge of your sketch window.
 24. Use the **Text** tool to show the labels of the ray's control points.
 25. Use the **Selection Arrow** tool to drag each point to observe how it controls the ray.
- Q4** A ray with endpoint A that passes through a point B is called ray AB (represented symbolically as \overrightarrow{AB}). Could it also be called ray BA ? Explain.



Introducing Points, Segments, Rays, and Lines

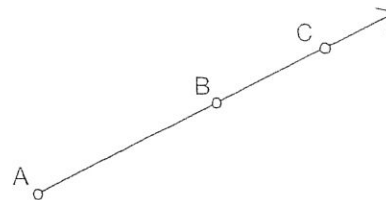
continued

26. Select the ray and go to the Measure menu. Note that **Length** is grayed out.

Q5 Why do you think you can't measure the length of a ray?

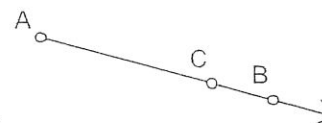
27. With the ray still selected, go to the Construct menu and look at your choices. Choose **Point On Ray**.

Q6 Why can't you construct the midpoint of a ray?



28. Drag this new point to see how its behavior compares to that of the ray's two control points.

Q7 Give two different names to the ray shown at right. Use just two points in each name.



29. Press and hold down the **Ray** tool, then drag right to choose the **Line** tool.

30. Experiment with drawing lines in your sketch.

Q8 List all the similarities and differences you can between segments, rays, and lines.

Q9 Name two rays and a segment that lie on the line below.



Q10 In Sketchpad, construct a line without using the **Line** tool. Explain what you did. Does your line remain a line when you drag points?

Geometry CP

Coordinate Geometry

(Sections 1.6, 3.5, 3.6)

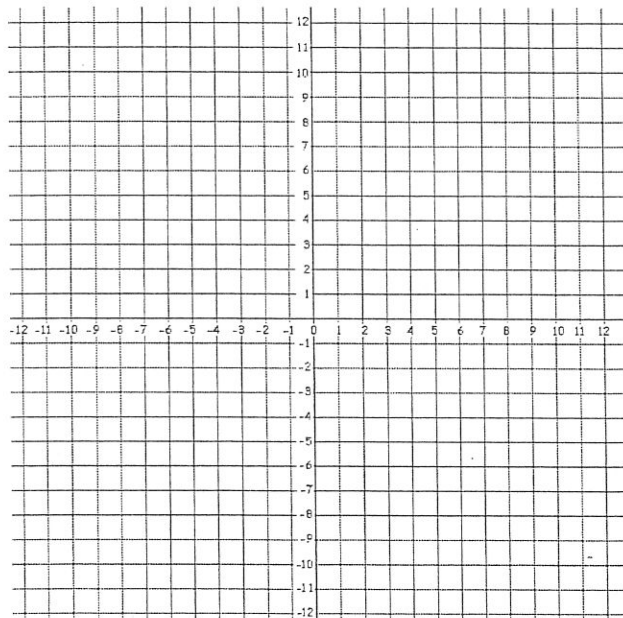
1.6 Notes: Distance and Midpoints in the Coordinate Plane (p.43-49)*Objectives:**Find the coordinates of the midpoint of a segment in the coordinate plane, using the Midpoint Formula.**Use the Distance Formula to find the distance between two points in the coordinate plane.*

The _____ is a plane divided into four regions by a horizontal line and a vertical line. The four regions are called _____. The horizontal line is known as the _____, and the vertical line is known as the _____. The location, or _____, of a point are given by an ordered pair (_____ , _____).

Use the coordinate plane to label the vocabulary and plot the following points.

LABEL THE COORDINATE PLANE:

Quadrant I Quadrant II
 Quadrant III Quadrant IV
 origin x-axis
 y-axis

**PLOTTING POINTS:**

A (-2 , 5)
 B (9 , -7)
 C (4 , 2)
 D (-1 , -8)
 E (0 , 5)
 F (-3 , 0)

DISTANCE FORMULA:

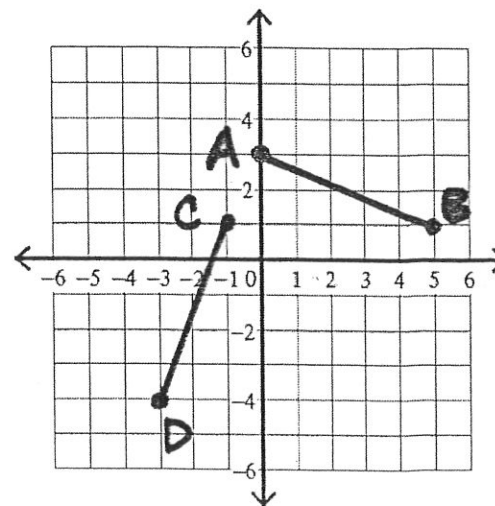
The distance formula is used to calculate the distance between two points in a coordinate plane.

The distance between two points (x_1, y_1) and (x_2, y_2) can be found by

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

a) A(0,3) and B(5,1). Find AB.

b) C(-1,1) and D(-3,-4). Find CD.



MIDPOINT FORMULA:

You can find the midpoint of a segment in a coordinate plane by using the coordinates of the endpoints.

Calculate the average of the x-coordinates and the y-coordinates.

The midpoint M of \overline{AB} with endpoints $A(x_1, y_1)$ and $B(x_2, y_2)$ can be found by

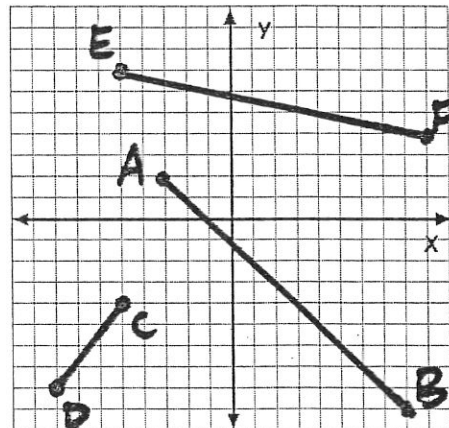
$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

c) Find the coordinates of the midpoint of \overline{EF} with endpoints $E(-2, 3)$ and $F(5, -3)$.

d) M is the midpoint of \overline{JK} . J has coordinates $(2, 2)$, and M has coordinates $(4, -3)$. Find the coordinates of K .

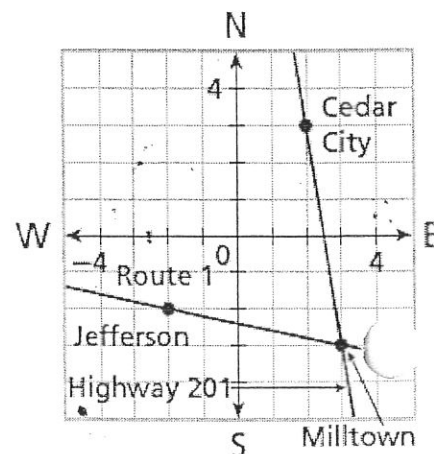
Practice:

1. Find AB .
2. Find the coordinates of the midpoint of \overline{EF} .



On the map, each square of the grid represents 1 square mile. Find each distance to the nearest tenth of a mile.

3. Find the distance along Highway 201 from Cedar City to Milltown.
4. A car breaks down on Route 1, at the midpoint between Jefferson and Milltown. A tow truck is sent out from Jefferson. How far does the truck travel to reach the car?



LESSON

1-6

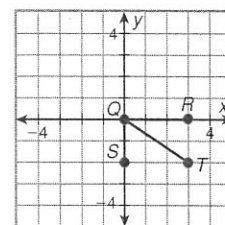
Practice A**Midpoint and Distance in the Coordinate Plane**

Complete the statements.

1. A coordinate plane is a plane that is divided into four regions by a horizontal number line, the _____, and a vertical number line, the _____.
2. The location, or _____, of a point are given by an ordered pair (x, y) .

Use the figure for Exercises 3–5.

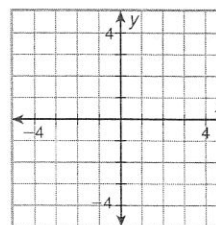
The midpoint of a segment has an x -coordinate that is the average of the x -coordinates of its endpoints $\left(\frac{x_1 + x_2}{2}\right)$. The midpoint of a segment has a y -coordinate that is the average of the y -coordinates of its endpoints $\left(\frac{y_1 + y_2}{2}\right)$.



3. Q has coordinates $(0, 0)$. R has coordinates $(3, 0)$. Find the midpoint of \overline{QR} . _____
4. S has coordinates $(0, -2)$. Find the midpoint of \overline{QS} . _____
5. T has coordinates $(3, -2)$. Find the midpoint of \overline{QT} . _____

Use the figure for Exercises 6 and 7.

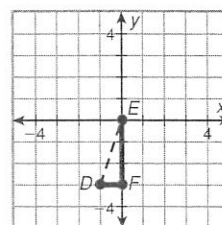
6. I is the midpoint of \overline{HJ} . H has coordinates $(0, 0)$, and I has coordinates $(-1, 2)$. Sketch these points in the coordinate plane. Study the graph and guess where J will be. Draw \overline{HJ} .



7. Find the coordinates of J by using the Midpoint Formula. _____

Use the figure for Exercises 8–12.

Manuel is out for a jog. The thick lines on the grid are jogging paths. He is on his way home and is at D . His home is at E . Each unit on the grid is 1 mile.



8. Name the coordinates of D . _____
9. Find how many miles Manuel will jog if he goes straight to the x -axis. _____
10. Find how many miles Manuel will jog if he stays on the jogging paths all the way home. _____
11. Find how many miles Manuel will jog if he goes straight to the y -axis. _____

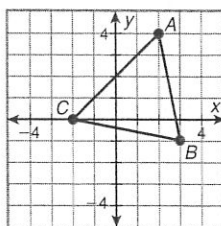
LESSON
1-6
Practice B
Midpoint and Distance in the Coordinate Plane

Find the coordinates of the midpoint of each segment.

1. \overline{TU} with endpoints $T(5, -1)$ and $U(1, -5)$ _____
2. \overline{VW} with endpoints $V(-2, -6)$ and $W(x + 2, y + 3)$ _____
3. Y is the midpoint of \overline{XZ} . X has coordinates $(2, 4)$, and Y has coordinates $(-1, 1)$. Find the coordinates of Z . _____

Use the figure for Exercises 4–7.

4. Find AB . _____
5. Find BC . _____
6. Find CA . _____
7. Name a pair of congruent segments. _____



Find the distances.

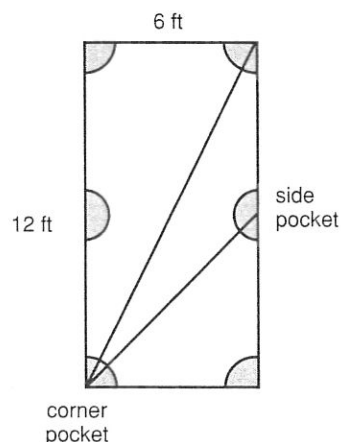
8. Use the Distance Formula to find the distance, to the nearest tenth, between $K(-7, -4)$ and $L(-2, 0)$. _____
9. Use the Pythagorean Theorem to find the distance, to the nearest tenth, between $F(9, 5)$ and $G(-2, 2)$. _____

Use the figure for Exercises 10 and 11.

Snooker is a kind of pool or billiards played on a 6-foot-by-12-foot table. The side pockets are halfway down the rails (long sides).

10. Find the distance, to the nearest tenth of a foot, diagonally across the table from corner pocket to corner pocket. _____

11. Find the distance, to the nearest tenth of an inch, diagonally across the table from corner pocket to side pocket. _____

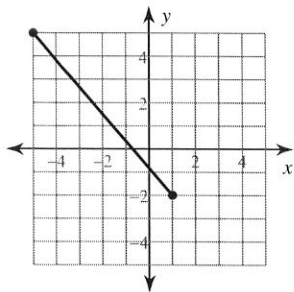


The Distance Formula

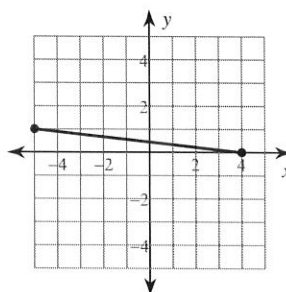
Date _____ Period _____

Find the distance between each pair of points. Round your answer to the nearest tenth, if necessary.

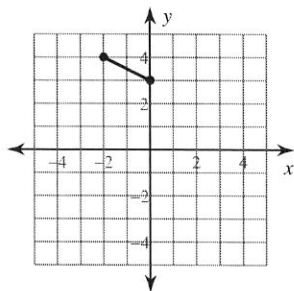
1)



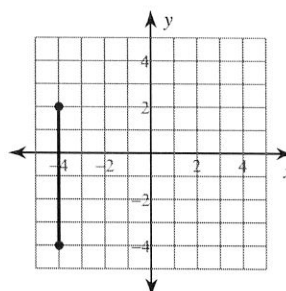
2)



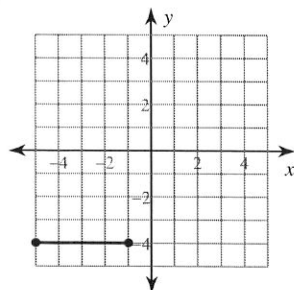
3)



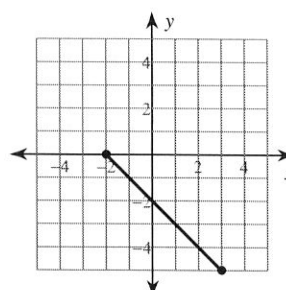
4)



5)



6)

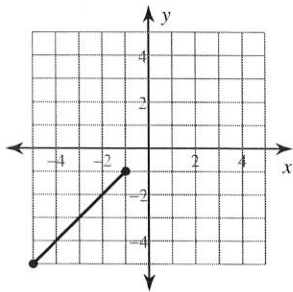
7) $(-2, 3), (-7, -7)$ 8) $(2, -9), (-1, 4)$ 9) $(5, 9), (-7, -7)$ 10) $(8, 5), (-1, 3)$ 11) $(-10, -7), (-8, 1)$ 12) $(-6, -10), (-2, -10)$

The Midpoint Formula

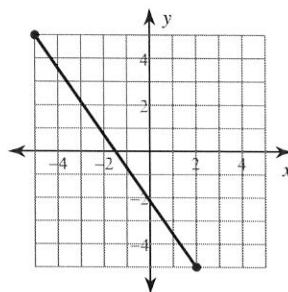
Date _____ Period _____

Find the midpoint of each line segment.

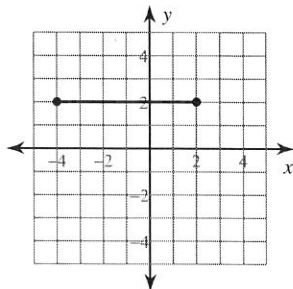
1)



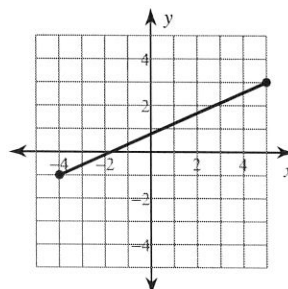
2)



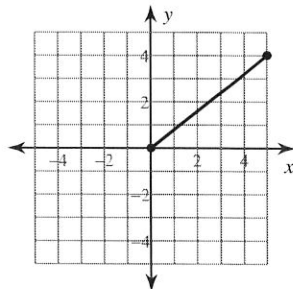
3)



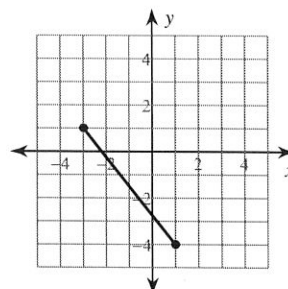
4)



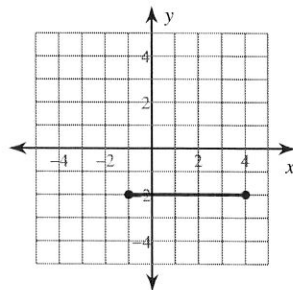
5)



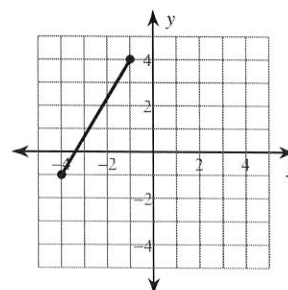
6)



7)



8)



Find the midpoint of the line segment with the given endpoints.

9) $(-4, 4)$, $(5, -1)$

10) $(-1, -6)$, $(-6, 5)$

11) $(2, 4)$, $(1, -3)$

12) $(-4, 4)$, $(-2, 2)$

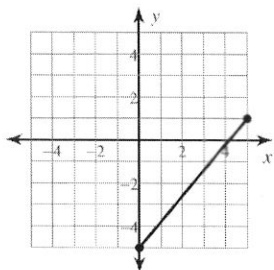
Name _____

Date _____

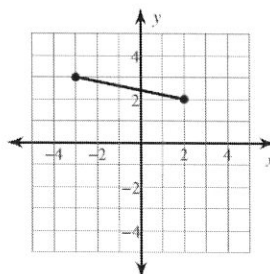
Distance and Midpoint Formula Practice

Directions: Find the Distance between the two points.

1.



2.

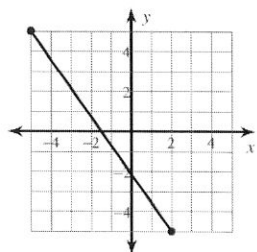


3. $(3, 8), (9, 10)$

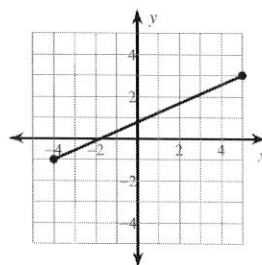
4. $(-8, 10), (-6, 7)$

Directions: Find the Midpoint between the two points. Use the graph to check your answer.

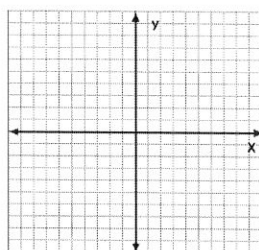
5.



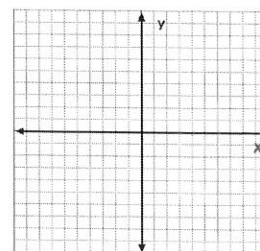
6.



7. $(-4, 4), (5, -1)$

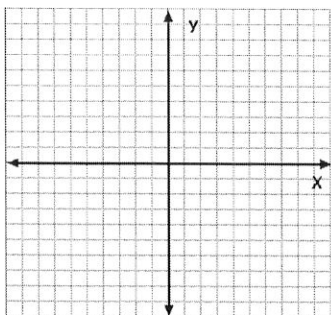


8. $(-1, -6), (-6, 5)$

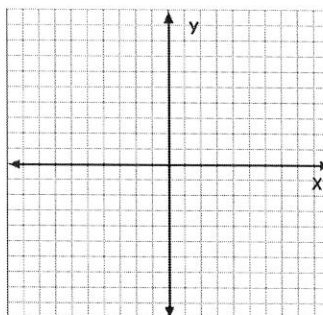


Directions: Find the **OTHER ENDPOINT** of the line segment with the given endpoint and midpoint

9. Endpoint: $(-1, 9)$, midpoint: $(-9, -10)$

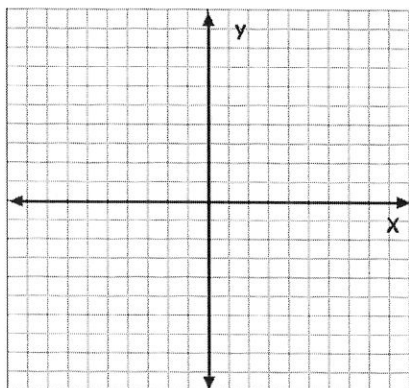


10. Endpoint: $(2, 5)$, midpoint: $(5, 1)$



Critical thinking:

11. On a map, with scale of 1 unit = 3.5 miles, the coordinates of John's house are $(-2, -8)$. The coordinates of Paul's house are $(1, -2)$. Paul's house is the midpoint between John's house and the library.
How many **MILES** does Paul live from the Library?



Name _____

Date _____

3.5 Notes: Slopes of Lines (p.182-187)*Objectives:**Find the slope of a line.**Use the slopes to identify parallel and perpendicular lines.*

The _____ of a line is a number that describes the steepness of the line. The slope of a line is the ratio of _____ over _____. Any two points on a line can be used to calculate the slope of the line containing those points.

The rise is the difference in the _____ of two points on a line.

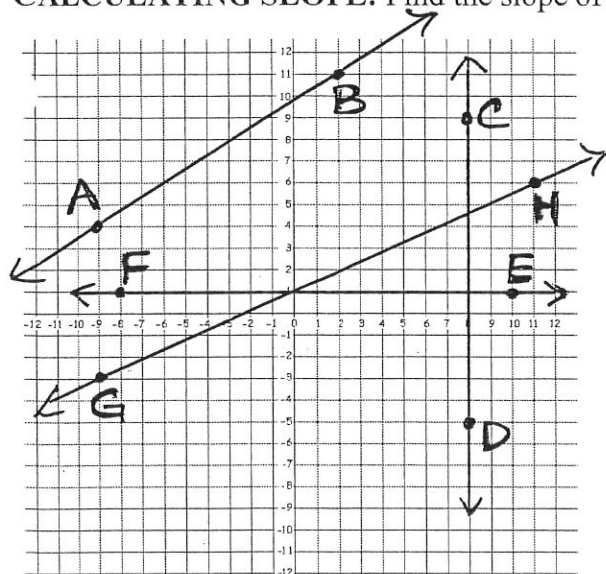
The run is the difference in the _____ of two points on a line.

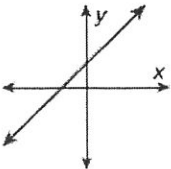
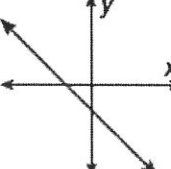
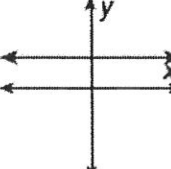
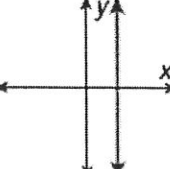
SLOPE FORMULA:

If $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ are two points on a line, then the slope, m , of the line is calculated by the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

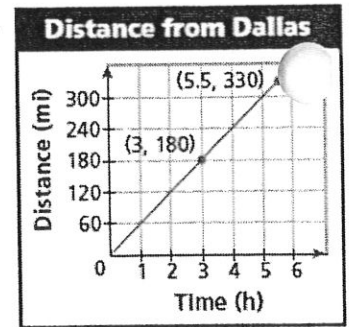
CALCULATING SLOPE: Find the slope of the indicated lines.

a) \overleftrightarrow{AB} b) \overleftrightarrow{CD} c) \overleftrightarrow{EF} d) \overleftrightarrow{GH}

<i>Positive Slope</i>	<i>Negative Slope</i>	<i>Zero Slope</i>	<i>Undefined Slope</i>
			

Application: Rate of Change in Miles per Hour (mph)

Tony is driving from Dallas, Texas to Atlanta, Georgia. At 3:00pm, he is 180 miles from Dallas. At 5:30pm, he is 330 miles from Dallas. Find and interpret the slope of the line.



- a) What was Tony's average speed in miles per hour.
- b) If Tony's average speed stay the same, how far will he have traveled by 6:30pm.

SLOPES OF PARALLEL AND PERPENDICULAR LINES:

PARALLEL LINES THEOREM: Parallel lines have the _____ slope.

- Any two vertical lines are _____.
- Any two horizontal lines are _____.

PERPENDICULAR LINES THEOREM:

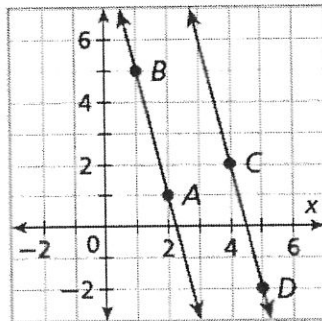
Perpendicular lines have _____ slopes.

- _____ and _____ lines are perpendicular.

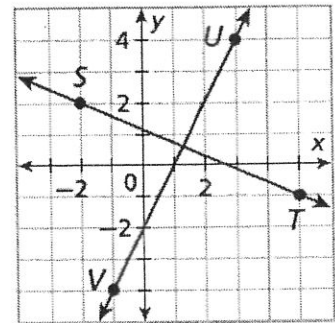
DETERMINING IF LINES ARE PARALLEL, PERPENDICULAR OR NEITHER.

Use the slopes of the lines to determine if the lines are parallel, perpendicular or neither.

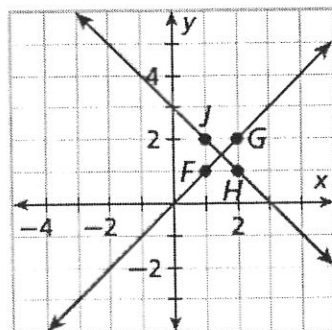
a) \overleftrightarrow{AB} and \overleftrightarrow{CD}



b) \overleftrightarrow{ST} and \overleftrightarrow{UV}



c) \overleftrightarrow{FG} and \overleftrightarrow{HJ}



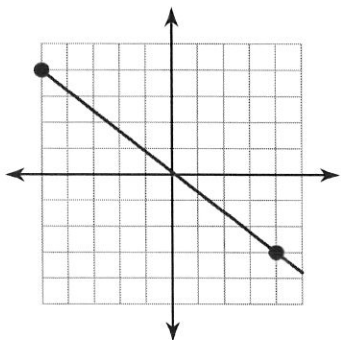
d) \overleftrightarrow{WX} and \overleftrightarrow{YZ} for W(3,1), X(3,-2), Y(-2,3), and Z(4,3)

Finding Slope From a Graph

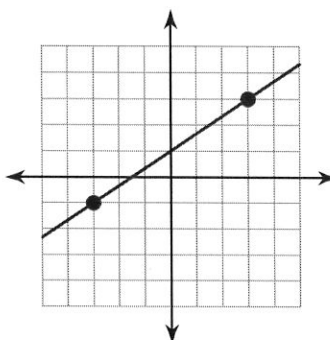
Date _____ Period _____

Find the slope of each line.

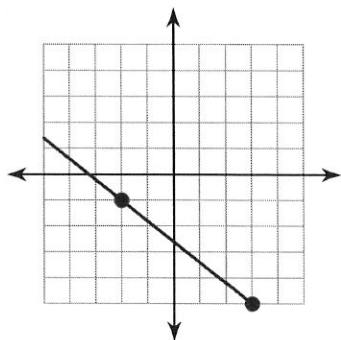
1)



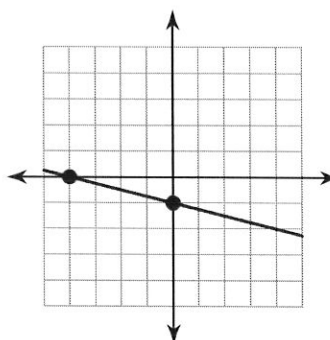
2)



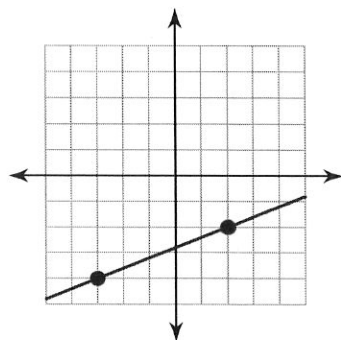
3)



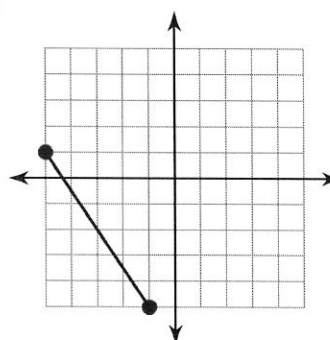
4)



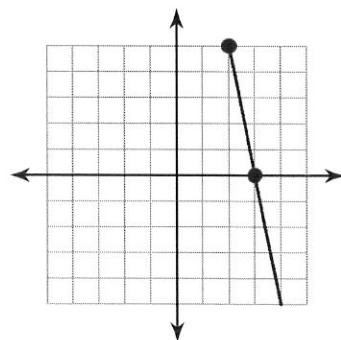
5)



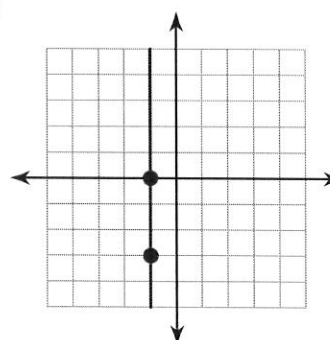
6)



7)



8)



Finding Slope From Two Points

Date_____ Period_____

Find the slope of the line through each pair of points.

1) $(19, -16), (-7, -15)$

2) $(1, -19), (-2, -7)$

3) $(-4, 7), (-6, -4)$

4) $(20, 8), (9, 16)$

5) $(17, -13), (17, 8)$

6) $(19, 3), (20, 3)$

7) $(3, 0), (-11, -15)$

8) $(19, -2), (-11, 10)$

9) $(6, -10), (-15, 15)$

10) $(12, -18), (-15, -18)$

11) $(3, -20), (5, 8)$

12) $(15, 8), (-17, 9)$

13) $(-19, 12), (-9, 1)$

14) $(12, 2), (-7, 5)$

15) $(6, -12), (15, -3)$

16) $(9, 3), (19, -17)$

3.6 Graphing Lines in the Coordinate Plane (p.190-197)

Objectives: Graph lines in the coordinate plane.

Find the equation of a line given a point and a slope.

Find the equation of a line given two points.

Forms of the Equation of a Line

Slope-Intercept Form	$y = mx + b$	Equation of a line with slope <i>m</i> and y-intercept <i>b</i> .
Point-Slope Form	$(y - y_1) = m(x - x_1)$	The equation of a line passing through the point (x_1, y_1) with slope <i>m</i> .
HOY Horizontal Lines	$y = b$ * Example: $y = -3$	Where <i>b</i> is the y-intercept. Slope of a horizontal line = 0
VUX Vertical Lines	$x = a$ * Example: $x = 2$	Where <i>a</i> is the x-intercept. Slope of a vertical line is undefined.

Graphing Lines in the Coordinate Plane:

To graph linear equations on the coordinate plane:

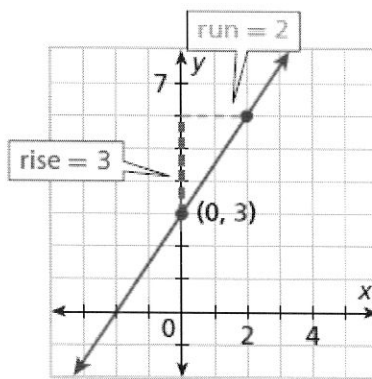
1. Rewrite the equation of the line in Slope-Intercept Form.
2. Plot the y-intercept, ***b*** on the coordinate plane.
3. From the y-intercept, use the slope to find additional points on that line.

Example: Graph $y = \frac{3}{2}x + 3$

The equation is given in slope-intercept form, with a slope of $\frac{3}{2}$ and a y-intercept of 3.

Plot the point $(0, 3)$ and then rise 3 and run 2 to find another point.

Draw the line containing the two points.

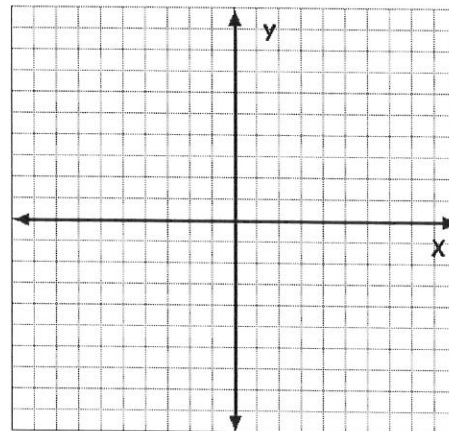


Try these:

Graph the lines on the coordinate plane.

A) $y = \frac{1}{2}x - 2$

B) $x = -3$



Writing the Equation of a Line in Slope-Intercept Form:

- When given a **point** (x_1, y_1) thru which a line passes and the **slope m** of the line, use the ***Point-Slope Form*** to find the equation of that line. Solve for y to write the equation in Slope-Intercept Form.

Example: Write the equation of the line passing thru $(-2, 1)$ with a **slope of 3**.

- When given two **points** (x_1, y_1) **and** (x_2, y_2) , first find the slope of the line passing thru those points. Then using the slope and one of the points, use the ***Point-Slope Form*** to find the equation of the line. Solve for y to write the equation in Slope-Intercept Form.

Example: Write the equation of a line passing thru the points $(8, -3)$ **and** $(-5, -7)$.

Try These:

Write the equation of the line passing thru $(-5, 2)$ with a **slope of $-\frac{3}{2}$** .

Write the equation of the line passing thru $(4, -6)$ with a **slope of 0**.

Write the equation of a line passing thru the points $(4, -1)$ **and** $(-1, -1)$.

Write the equation of a line passing thru the points $(6, -8)$ **and** $(6, 2)$.

Using the Graphing Calculator to Solve an Application:

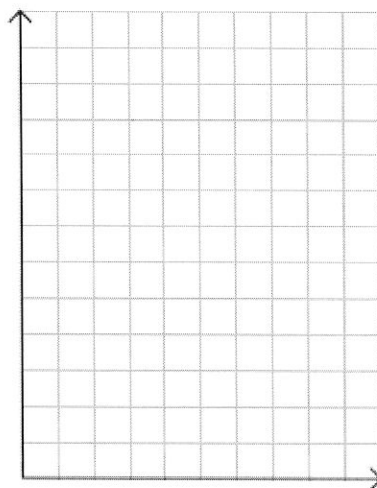
Problem-Solving Application

Audrey is trying to decide between two health club plans. After how many months would both plans' total costs be the same?

	Plan A	Plan B
Enrollment Fee	\$140	\$60
Monthly Fee	\$35	\$55

Plan A: $y = 35x + 140$

Plan B: $y = 55x + 60$



HW:

Graph the following lines on the coordinate plane.

1.) $y = 8$

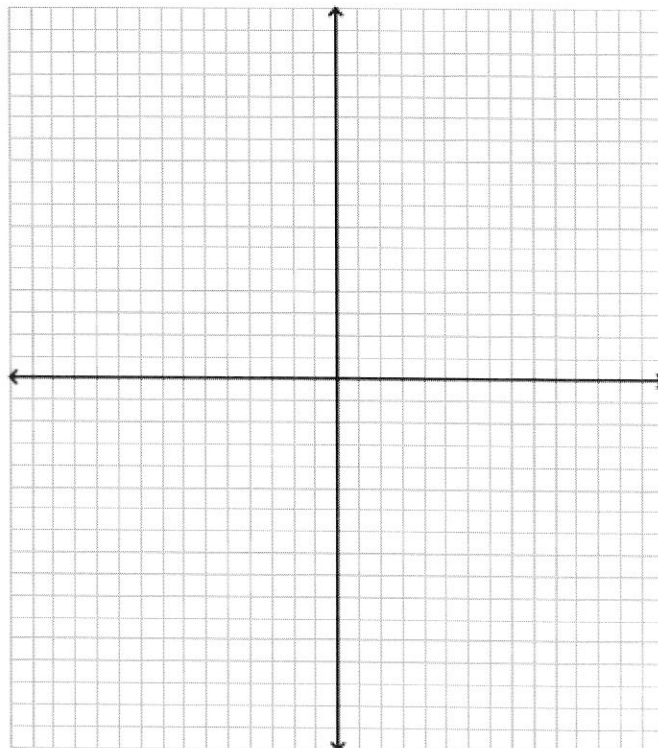
2.) $y = -\frac{3}{4}x - 7$

3.) $y = 5x - 2$

4.) $x = -9$

5.) $3x + 2y = 8$

6.) $12x - 6y = 36$



Write the equation of the lines in slope-intercept form. Graph and label the lines on the coordinate plane.

7.) Write the equation of line l passing

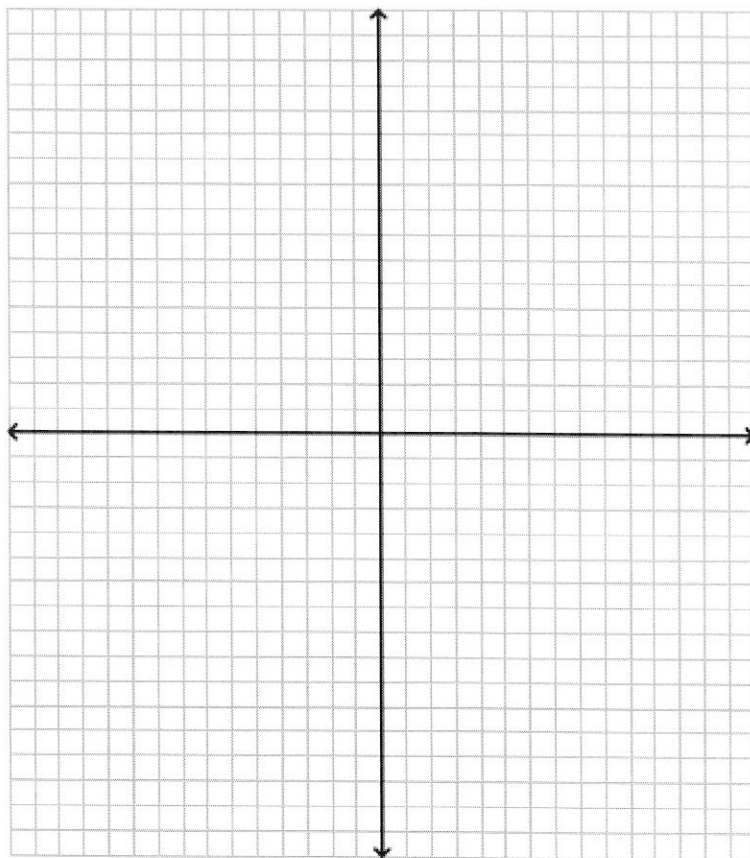
thru $(-8, -3)$ with a **slope of** $-\frac{1}{5}$.

8.) Write the equation of line m passing

thru $(5, 9)$ with an **undefined slope**.

9.) Write the equation of a line passing
thru the points **A(7 , 5) and B(-2, -4)**.

10.) Write the equation of a line passing thru
the points **C(-1, -3) and D(6, -3)**.

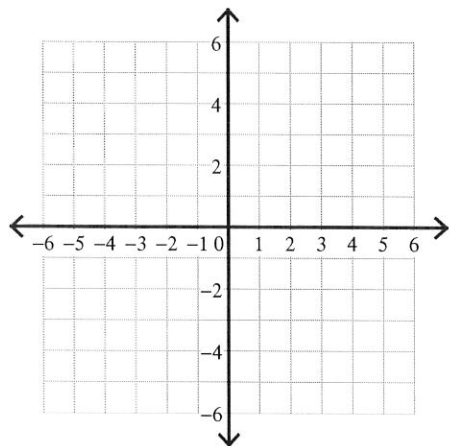


Graphing Lines

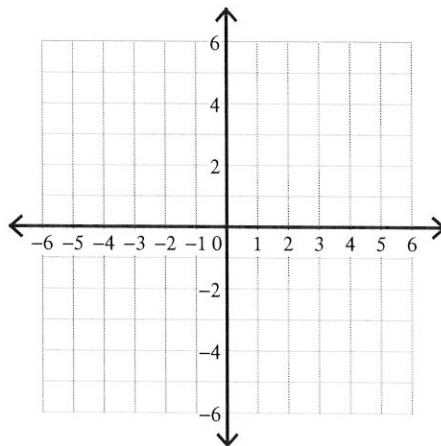
Date _____ Period _____

Sketch the graph of each line.

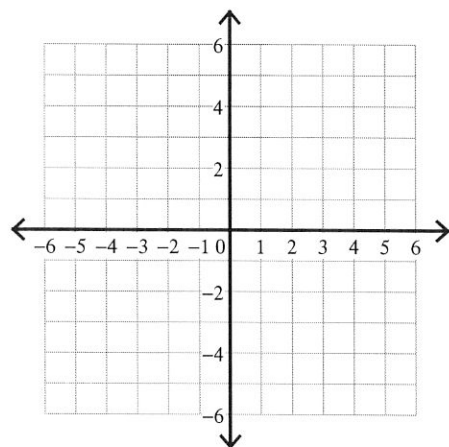
1) $y = -\frac{1}{5}x - 2$



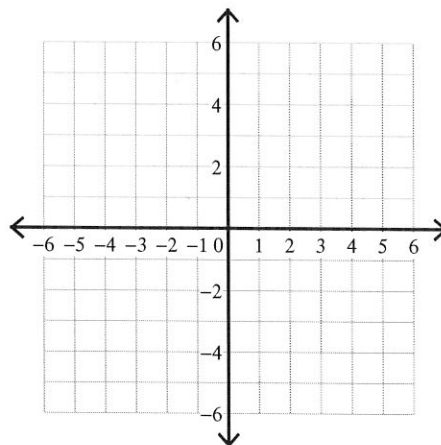
2) $y = -5x - 1$



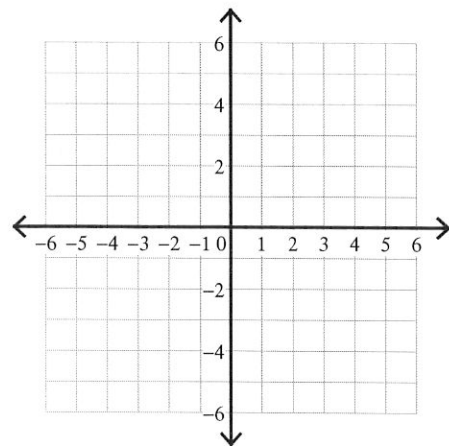
3) $y = -\frac{5}{2}x$



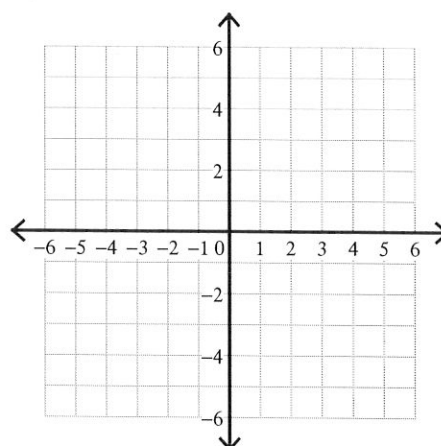
4) $y = -7x + 3$



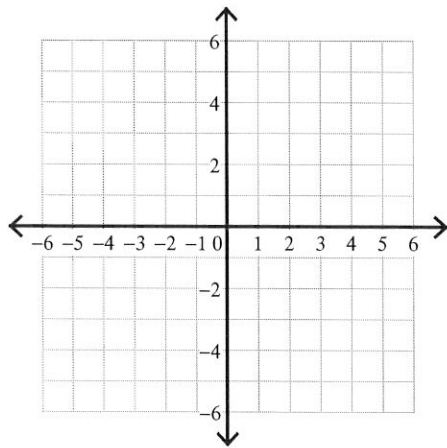
5) $y = 2x - 5$



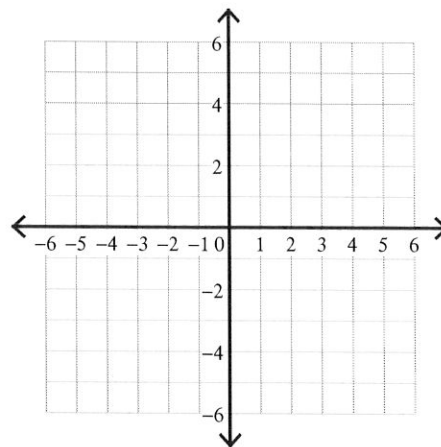
6) $y = -6x + 1$



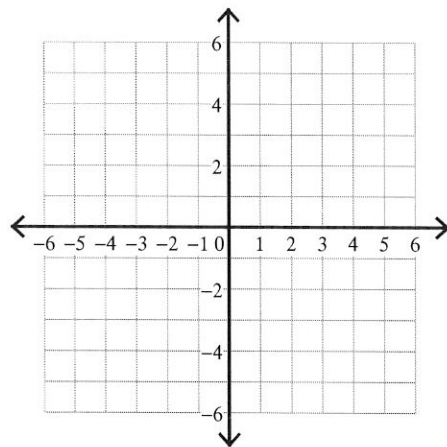
7) $y = -\frac{1}{3}x + 4$



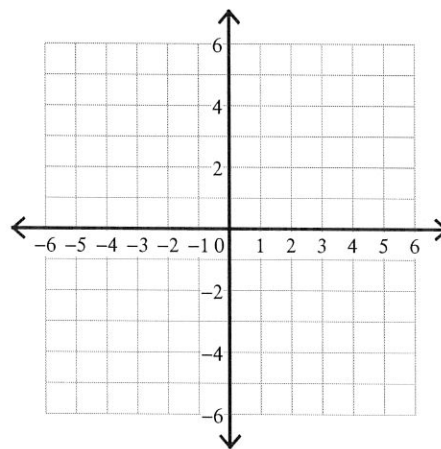
8) $y = 0$



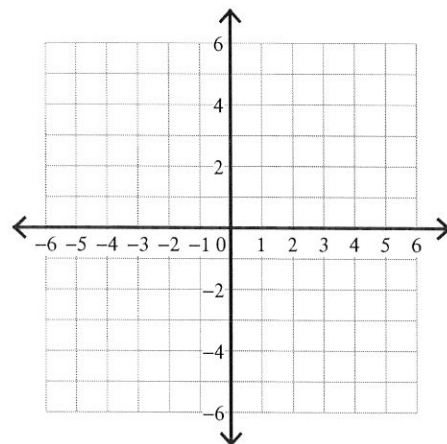
9) $y = -\frac{2}{5}x - 4$



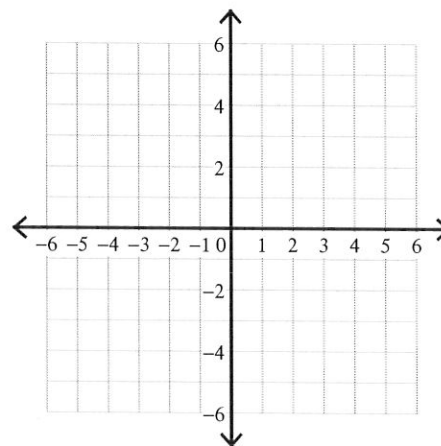
10) $y = 7x - 5$



11) $y = -6x + 5$



12) $y = -\frac{5}{2}x + 5$



Writing Linear Equations

Write the slope-intercept form of the equation of each line.

1) $3x - 2y = -16$

2) $13x - 11y = -12$

3) $9x - 7y = -7$

4) $x - 3y = 6$

5) $6x + 5y = -15$

6) $4x - y = 1$

7) $11x - 4y = 32$

8) $11x - 8y = -48$

Write the standard form of the equation of the line through the given point with the given slope.

9) through: $(1, 2)$, slope = 7

10) through: $(3, -1)$, slope = -1

11) through: $(-2, 5)$, slope = -4

12) through: $(3, 5)$, slope = $\frac{5}{3}$

13) through: $(2, -4)$, slope $= -1$

14) through: $(2, 5)$, slope $=$ undefined

15) through: $(3, 1)$, slope $= \frac{1}{2}$

16) through: $(-1, 2)$, slope $= 2$

Write the point-slope form of the equation of the line described.

17) through: $(4, 2)$, parallel to $y = -\frac{3}{4}x - 5$

18) through: $(-3, -3)$, parallel to $y = \frac{7}{3}x + 3$

19) through: $(-4, 0)$, parallel to $y = \frac{3}{4}x - 2$

20) through: $(-1, 4)$, parallel to $y = -5x + 2$

21) through: $(2, 0)$, parallel to $y = \frac{1}{3}x + 3$

22) through: $(4, -4)$, parallel to $y = -x - 4$

23) through: $(-2, 4)$, parallel to $y = -\frac{5}{2}x + 5$

24) through: $(-4, -1)$, parallel to $y = -\frac{1}{2}x - 1$